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Blanchet's Pneumatic Hoisting From Deep Mines.

Transactions, North of England Institute of Mining Engineers.

THE extraction of coals from great depths, of 1,000 yards or more, has been for a long time an object of study for all mining engineers.

It was one of the questions proposed by Mons. GRÜNER, in 1855, in his recital of the objects for which the Societé de l'Industrie Minérale was instituted and of the works it had undertaken.

Many suggestions have been made on this subject, and many systems have been projected and tried. To this end it was proposed to place several machines, one above the other, in the pit—to replace vertical pits by immense inclined planes—and after the trials of the apparatus of Mehu, and the propositions of Guibal, Shütz and others, to utilize the pressure of the atmosphere or that of compressed air, in a similar way to the railway of St. Germain, and the hoist of St. Jaques à Mont Luçon. Of these suggestions, the atmospheric system has not yet been applied to mines. This system carried out by means of a vacuum, as in the tube of St. Germain, and provided with a slit with valves running the whole length of the tube, did not seem to be sufficiently safe to use in a pit. It was thought that a tube of a large diameter would take too much space and be too expensive, and that a small tube, with a number of tubs, one above the other, would be unmanageable from the difficulty there would be of changing the tubs, both at bank and below; and, also, it was thought that the tube should be bored like a cylinder from top to bottom to enable the piston to work with the requisite smoothness, which would render the manufacture too costly.

The atmospheric system carried on by means of compressed air presented the same difficulties in changing the tubs, and it was thought would also require a bored-out cylinder.

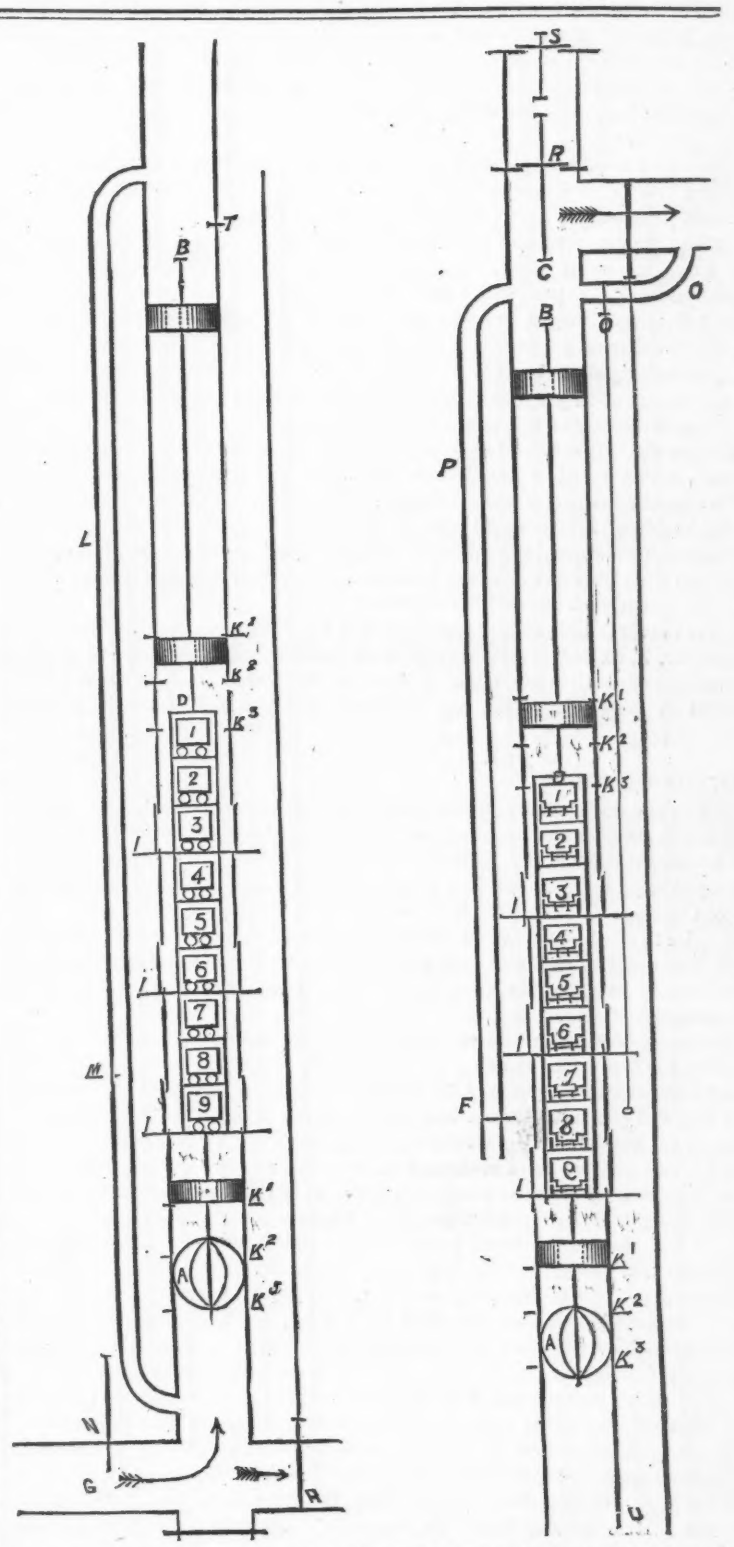
All these points were considered without pushing the experiments further. The question did not seem to press for an immediate solution as it was not necessary at the time to work mines of 1,000 yards depth. When the necessity did present itself the question became one of great importance and became solved in consequence. This was the case at Epinac, where the Hottinguer pit was commenced on the 26th May, 1863, and the seam was reached on the 17th Nov., 1871 by a gallery 120 yards long through the strata above the seam at a level of 674 yards. This pit is now sunk to about 763 yards to cut the seam directly, which it had before gained through a gallery at a depth of 374 yards. The pit is at a distance of 1,093 yards from the highest point of the workings to the rise, the level of which is 490 yards. It has opened out an area of 988 acres and 1,400 million cubic feet of coal, which it reached at depths varying from 530 to 1,090 yards.

The problem was, how to commence working the pit without waiting to sink a second or upcast shaft, and yet secure the requisite ventilation which, of necessity, would have to be considerable to reduce the temperature in the workings, which otherwise would reach from 90 to 120 degrees; to guard against all accident from fire-damp, and to avoid the use of ropes.

This problem has been solved by Mons. BLANCHET, director of the collieries and railway at Epinac. This engineer, carrying out the idea of using the pressure of the atmosphere to extract coal from pits of great depth, more especially with regard to the pit at Hottinguer, thought of substituting, for the second or upcast shaft, a wrought iron tube, and making this tube a cylinder in which a piston, with the cages suspended, should traverse by the action of the air without the use of ropes. This tube was put inside the first pit which was large enough to hold it without inconvenience, being about 18 feet diameter. He decided upon extracting air from the tube, because this did not produce heat, and he succeeded by exceedingly simple means in causing the ascent and descent of the nine tubs placed one above the other in the cage and putting them out at bank and below with facility and ease. The whole project was tried on a model made to one-tenth the size required for the pit. This model was sent to the Exhibition at Lyons, and was submitted to the most severe and independent criticism. It was made in the workshops of the Societé des Houillers.

The following is a description of the apparatus that is now being made at Creuzot for the Hottinguer pit, the action of which is illustrated in the diagram.

A cylindrical tube 63 inches diameter and about 5-16 of an inch thick, made of plate iron, rivetted together with butt joints and countersunk rivets, runs from top to bottom of the pit. It is made in about 20 feet lengths and joined together by means of flanges and bolts. Each length is hammered to a perfectly cylindrical form upon mandrils passed through for that purpose.



It was thought for some time that these tubes would have to be bored out, but the experiments at Epinac have shown that, made as described above, the ordinary lubrication of the tube is sufficient to render it tight at the pressure and temperature required.

This tube is placed in a special compartment of the pit, from the sides of which it is isolated. It is supported every 10 feet by buntings similar to those used for

g the pumps. These buntings are so arranged that at any time a single tube can be withdrawn without disturbing the others.

To render the whole independent of any movement that might take place in the pit, the buntings are not firmly built in the sides, but are free to slide upon two smaller buntings in the lining. The piston is made in two parts, one at the top and the other at the bottom of the cage. The top piston is made of two platforms at such a distance apart, that, in passing by the doors to admit the tubs, one shall always be in an uncut portion of the tube in order that the pressure shall remain constant when the piston is passing these doors. The lower part of the piston below the cage is made of one platform, and, if necessary, isolates the space occupied by the cage from the atmosphere below. A valve is placed in this platform which can be opened when men are riding to afford them the necessary air for breathing. It also carries a centrifugal parachute, A, to prevent the too rapid descent of the cage in case of accident.

The top plate of the piston carries a spring buffer, B, which diminishes the shock when the valve, C, above is struck by the ascending piston. The piston is of simple construction. It can be made of wood protected with iron, packed with India-rubber at the edges, and covered with leather secured by bands of brass, or soft metal composed of a mixture of lead, zinc, tin, and antimony.

The cage, D, is made in the usual way, and is constructed to hold nine tubs, one above the other, each containing about 20 cubic feet, the whole carrying about 4½ tons of coal.

The total weight of piston, cage, tubs, and coal is 26,450 lb., or about 12 tons, spread over the surface of the piston which has about 3,117 inches area. This gives a pressure, per square inch, of $\frac{26450}{3117} = 8{\cdot}4$ lb.

When the pumping engine has reduced the air above the piston to 15 — 8·4 = 6·6 lb. per square inch, the piston will commence its ascent with a speed dependent upon the speed of the exhausting cylinders. These exhausting cylinders are 108 inches diameter, or 63·6 square feet area, and nearly 10 feet stroke, the two together exhausting 2,544 cubic feet per stroke, or 430 cubic feet per second, the engine making about 10 strokes per minute. The load will rise in the tube, which has a section of 21·5 square feet, with a speed of $\frac{430}{21{\cdot}5} = 20$ feet per second.

With machinery of this power it would take about 52 strokes to reduce the pressure above the piston to 6·6 lb. per square inch, and cause the cage to ascend, which, with a speed of about 200 feet a minute, would occupy about 2½ minutes. The extracting engine would continue to work during and after the ascent, and considerable advantage would arise from having a reservoir of convenient size from which the apparatus could extract the air during the descent of the piston.

When the piston has to descend, the exhaustion from the tube is stopped, and its connection with the extracting engine is severed by means of doors or valves, E, and the air is allowed to press upon the top of the cylinder by means of a regulator, F, so that its pressure can be augmented till it reaches the point where it will cease to sustain the weight of the cage without the coal, or till it reaches 26,450 lb. the weight of the cage and coal, less 10,080 lb. the weight of coal,

$$\frac{16370}{3117 \text{ area of piston.}} = 5{\cdot}21 \text{lb.}$$

Valves and doors, G, are so arranged in the tube that the air is taken up from the return air course on the ascent of the piston and delivered outside the mine on its descent through H. Each descent, therefore, discharges a volume of foul air equal to 70,632 cubic feet in a tube 3,270 feet long, which, of course, is replaced by fresh air descending into the mine.

In order to get the tubs in and out, three double doors, I I I, are cut in the tube, both at top and bottom, and these correspond to three levels of the heapstead. The full tubs go out of the doors at one side, and the empty ones go in at the doors on the other.

The whole of the nine tubs are changed by three movements of the cage. At the top, the first movement changes the 1st, 4th, and 7th tubs; the second movement changes the 2nd, 5th, and 8th tubs, and the third movement changes the 3rd, 6th, and 9th tubs. When the cage is at the bottom, the first movement changes the 3rd, 6th, and 9th tubs, the second movement changes the 2nd, 5th, and 8th tubs, and the third movement changes the 1st, 4th, and 7th tubs.

In order to keep the cage steady and opposite to the doors for inserting and withdrawing the tubs, three double sets of stops are introduced so that they can be thrust into the tube and withdrawn by means of one lever. These stops are numbered 1, 2, and 3, from top to bottom. When the cage is confined between the stops K 3 of the two sets, the tubs 1, 4, and 7 can be handled. When the cage is confined between the stops K 2 of each set, the tubs 2, 5, and 8 can be handled; and when the cage is confined by the stops K 1 of each set, the remaining tubs 3, 6, and 9 can be handled. The top stops prevent the cage ascending, and the bottom stops prevent it from descending. The cage with its piston is then confined between the two sets of stops during the whole time the tubs are being changed, and is moved up and down with the greatest facility by means of equilibrium pipes and cocks as will be described.

At the bottom of the pit the equilibrium pipe L goes from the bottom of the tube to a point sufficiently high to be above the piston during the whole time the tubs are being changed. When the cock M in this pipe is shut the pressure of air in the bottom keeps the piston up against the top stops, and when the cock is open, and the main inlet and outlet valves N H shut, the air below is rarefied to the required point to allow the cage to fall on to the bottom stops. Between the top and bottom set of stops there is a play of about one inch.

At the top of the pit the tube has two pipes, P and O, each provided with stop cocks F and Q. The first communicates with the atmosphere and allows air to enter above the piston and cause it to descend. The second is in communication with the exhausting engine and is arranged to increase at will the amount of vacuum, above the piston, to enable it to rise with the cages as each successive group of tubs is withdrawn.

By means of special arrangements, either electrical or otherwise, the position of the cage in the tube, during its ascent and descent, is clearly indicated both to the men at bank and below.

When the cage ascends, the doors I I I for changing the tubs are shut, together with the door on the pipe H which communicates between the bottom of the tube and the top of the mine, and when the cage arrives at the top it is made to stop—first, by automatically shutting at U the communication with the exhausting engine at E; secondly, by lifting the valve R and admitting the pressure of a certain quantity of air on the piston; and, thirdly, if the ascent still continues, by lifting the valve S at the top of the tube and allowing the free entry of the atmospheric pressure.

When the cage descends it forces the air from the bottom of the tube through the escape valve H to the surface. When it comes near to where it has to stop it automatically closes the escape valve at T, and compresses the air in the bottom of the tube. The air can then be admitted from the under side of the piston into the partial vacuum above the piston by means of the equilibrium pipe L and cock M, so as to lower the cage upon the stops at will. The pressure above and below the piston is indicated by pressure gauges.

All the movements of the cage are effected with the greatest ease. An accident could not possibly arise unless all the doors of the apparatus were open, which it is almost impossible could occur. In order, however, to effectually guard against any possibility of danger, a centrifugal parachute A is attached to the bottom of the cage. This parachute is composed of circular hoops of steel nearly the diameter of the tube, furnished with wooden brakes where they approach the side of the tube and driven round by friction wheels fixed to the piston and running against the tube. The bands are free to move up or down upon their axes, and if their speed exceeds a certain limit the hoops will become oval and the wooden brakes will press against the sides of the tube, and by their friction prevent the too rapid descent of the cage.

TO BE CONTINUED.

The Ingersoll Rock Drill.

(WITH SUPPLEMENT.)

No machine exhibited at the last fair of the American Institute in New York attracted more attention than the INGERSOLL Rock Drill. Of course, the conditions at a fair are not such as to afford a tool of this kind a fair opportunity for displaying its powers, as the noise incidental to its work is too great to permit its free and constant action without annoyance to the crowds of visitors. But in the trials which were made at intervals, the rapidity with which the INGERSOLL drill did its work, the precision of its action, and the ease with which it was managed, made its excellence perfectly apparent.

We publish in a supplement this week a number of illustrations showing the construction of the drill and the adaptation to the different kinds of rock cutting. The machine consists of a double-acting cylinder and piston, the piston rod carrying the drill tool itself, which, as is usual in all machines of the kind, has an × cutting face. The cylinder is cushioned at each end just beyond the regular piston stroke, which effects a saving of air or steam, and prevents shocks very effectively, and when the drill is at work the motion of the machine is very slight, even when delivering its hardest blows.

The arrangements for feeding the drill—one of the most important parts of such a machine—are excellent. The forward movement of the tool is governed by the motion of the piston, and the latter never acts upon the feed until the rock is sufficiently penetrated for this purpose. From this it results that the feed is strictly automatic, and a steady progress at just the rate which the hardness of the rock and the pressure of steam will permit is thus attained. It will be noticed that as the drill manages its own feed and the rock controls its own hardness, there remains only the steam pressure within the control of the operator. Thus the management of the drill is reduced to the simple act of turning on more or less steam, and this, together with the simplicity which has been studied in the general design, makes it very easy to teach any man at all accustomed to machines how to work it. This simple mode of regulation by no means decreases the usefulness of the drill. No cut-off is used, but the full force of the steam is used through the whole stroke, as the makers have found by experience that much greater effectiveness is attained in this way. This arrangement permits the machine to work within very wide limits of force, so that it can be closely adapted to the special conditions—as to hardness of rock, desired rapidity of penetration, etc.—under which it is working.

Many excellent features have been introduced in the modes of mounting the drill. One of our illustrations shows the tunnelling machine. This consists of a light car, provided with a vertical arm on which a brace can be run up against the roof to hold the car firmly in position. At the base of this arm a strong horizontal beam projects beyond the front of the car, this beam resting on a pivotted joint and being moved up and down by a screw. It works between curved guides which give it steadiness, and at the forward end is another vertical screw which is also run up against the roof. It is plain that all these braces are ample to give the beam all desirable rigidity. The whole is mounted on an iron plate

which has a certain amount of side motion on the car so that any desired direction, not parallel to the line of rails on the tunnel floor, can be given to the whole system. On the end of this beam, and at right angles to it, is a horizontal bar which carries the drills. The bar can be moved in and out, so that when projections of rock prevent the approach of the car itself to any given part of the face, the long projecting arm and the mobility of the drill carrier allow the approach of the drills themselves close to the face. This obviates the necessity of using long drills, which strain the machinery. Each drill as mounted on the bar or carrier, in addition to the motions described above, which it receives in common with the whole system, is capable of complete horizontal and vertical revolution. From this description it will be seen that when the whole machine has received the necessary general direction, each one of the drills can be made to play upon any point, above, below, behind or in front of the carrier to which it is attached. The "tunnel drill" is therefore a complete tunnelling machine capable of excavating over a very large mining face. From 4 to 8 drills are mounted upon this car.

One of the other modes of mounting illustrated by us is the Gadding Drill. A small iron derrick is mounted on a car, which is provided with wheels for easy movement, and also with adjustable standards to rest upon while at work. The drill hangs on a frame which is moved up and down by a chain and wheel as shown. Either horizontal, angular, or vertical holes can be made with great speed. In addition to these, the improved Tripod Drill is illustrated in our supplement. This is the best for vertical drilling and the ordinary work of blasting. A single brace bar is also shown, suitable for drift work and those situations where the lighter brace will answer as well as a tripod. All the machines are built to scale so that repairs are easy and cheap.

As to results, the makers are able to point to excellent service done by their drills in a great number of difficult situations. Their smallest size is a 2½ in. (the piston diameter) drill, used for quarry work, gadding, etc. It is light, weighing only 123 lb., bores any hole from 1—1¼ inches, has a stroke of 3½ in., and delivers 800 blows per minute. At the celebrated Palmer mine of magnetic iron ore, owned by Messrs. J. & J. ROGERS, Ausable Forks, New York, one of these bored 170 feet of 1¼ in. hole in ten hours.

The next larger size has a 3¼ in. cylinder, makes a 5 to 7 in. stroke, gives 500 blows per minute, and weighs 295 lb. It will bore a 1½ to 2 in. hole to the depth of 10 feet.

The 4 in. drill has a 7 in. stroke, gives 400 to 500 blows per minute, and weighs 472 lb. It bores to 3 in. diameter and to 15 ft. in depth.

Finally, the largest size has a piston of 5 in. diameter. In soft rock an 8 in. stroke, with 400 blows per minute, is used. In hard rock the stroke is only 5½ in. It will work to a depth of 40 ft., and bore a hole from 2 in. to 5 in. in diameter. Its weight is 558 lb., but it is made in sections so that no piece weighs more than 150 lb.

All these drills can be worked by compressed air or steam, as desired. They have been employed at the celebrated mines of Iron Mountain and Pilot Knob, in Missouri; in the tough sand hard trap of Bergen Hill, N. J.; in granite and limestone. In fact, these drills have a history behind them that is a sufficient guarantee of their quality. They have bored steadily 80 feet a day in granite, the holes averaging 8 feet in depth and 3 inches in diameter. In trap they averaged 23 feet a day for several months, the holes being 4 inches in diameter and 18 to 24 feet deep.

Specimens of this drill in its various forms can be seen at the office of the Ingersoll Rock Drill Company, 239 Broadway, New York. After May 1, their office will be at No. 5 Park Place, near the office of this journal.

Mining Engineering.

Prepared for "Johnson's Universal Cyclopedia," by PROF. F. H. VINTON, E. M.

(CONTINUED FROM PAGE 139.)

THE second line of attack may be by a slope cut in the dip of the vein and sunk at once to a considerable distance. From the slope levels are drifted to right and left in the strike, and the mass of the vein intersected by them may be further divided by inclines between the levels, so as to reduce the mass, as before, to a system of independent and disengaged parallelopipeds, as a preparation for the exploitation. The advantage of a slope appears that it is in itself an exploitation, since it produces at once the material sought, and thereby pays for itself, either more or less. Its disadvantages are that the flanking masses which must be left for its support and protection may be more valuable than the economy of the slope itself; that it is in more danger of shifting than an adit in the firm; that it makes a longer line of hoisting ways, cables and pumps; and that, if the vein be irregular, and the slope consequently variable, the difficulties of hoisting and transmission of the pump action, with wear and tear and the other objections, become too formidable or too exacting to leave such an adit in economic conditions. Therefore, generally for all deposits below the drain of the surface, the simplest, safest, and cheapest way is to attack by a vertical shaft quite in the firm—that is, the sterile or country rock—cutting the vein either at the lowest point of proposed exploitation or at some other, and also connected at different levels with the vein by horizontal adits of sufficiently large section for ample rolling material and unobstructed movement. These adits, twenty or more metres apart vertically, are directed through the country rock across to the vein, with a slight slope toward the shaft, and from the points where they intersect the mineral mass, levels or gangways are driven, as has been already indicated, and these being connected by slopes, fifty to seventy metres apart horizontally, the preliminary tracing and preparation is seen to be effected, as in the other cases. Such methods of tracing apply to all veins not more than three metres thick, no matter what their dip may be, though in coal beds the tracing is usually more developed than in metallic veins; that is, the levels and inclines are spaced further asunder, since, as it is an object always to win coal in large fragments, the fronts of attack should be freely developed. As a proper ventilation is necessary during this preparation, as well as in subsequent operations, the openings must communicate either with two shafts which are sunk *pari passu*, or the single shaft must be divided by a bulkhead caulked so tight that the one portion may serve for the downcast of air and the other for the upcast. It is evidently best to sink two shafts, either of which may serve in emergency for the egress of the miners.

The shaft in which the pumps are is preferable for the downcast, and the air should be first carried clear to the bottom of the lowest occupied openings, and then allowed to return, more or less divided, always upward towards and into the upcast. Let us now fix our attention upon a metallic vein, less than three metres thick, inclined more than forty degrees, and observe how the masses resulting from the tracing are stoped, the main object being to extract the whole of the wealth of the lode, if that is possible, with economy. In this assumed case the exploitation is effected by underhand stoping or by overhand stoping.

Underhand stoping consists in attacking an *upper* corner of a subordinate mass and cutting it away in steps or stopes of two metres high, the miners following each other at distances of four metres, so that to look in at the end of such a stope would be to see an irregular stairway, very rude and rugged and variable in breadth, whose flanks leaned sideways and upon whose steps groups of miners might be distinguished by the dim light of lamps or candles, drilling, picking, undermining, forging, driving wedges or blasting. The miners advancing in this procession leave behind them the emptied chasm of the vein, but across this they jam props or stulls of round timber, upon which boards, slabs or logs are laid, and form platforms whereon the refuse rock and gangue, resulting from the triage or sorting in the mine, is heaped, so that it often accumulates a substantial filling between the two walls. The stuff to be extracted is shovelled, hauled and tumbled down the steps to the lowest one open, where it is transmitted to a gangway, or an incline, from which it is in time transported to the hoisting way.

In overhand stoping, one of the *lower* angles of a subordinate mass is attacked; the first miner, therefore, moves forward directly over and on top of a timbered gallery or gangway. He stulls behind him more or less, and so may all the miners who follow behind him at distances of four metres, and above him at distances of two metres; but the refuse piles up naturally on the timbering of the gangways, and requires, therefore, less wood for support than in underhand stoping. In overhand stoping the action of gravity somewhat aids the miner, but at the same time renders his position in a degree unsafe. Moreover, the stuff taken down falls upon the refuse, and thereby small fragments, yet of value, may be lost in the crevices of the filling unless this be covered with cloth or plank.

Underhand stoping may be accounted best for metallic veins, but it will not do for coal, because in underhand stoping the miners are constantly tramping upon the material itself, and coal is very susceptible of depreciation from heating and handling, a wear which would not be at all disadvantageous to an ore product, every particle of which could, in fact, be collected from the steps. The exploitation of coal, however, is best treated in its place, as a branch of mining quite apart and almost separate from the present; but finally any metallic vein of a dip over 40°, and not too wide to be stulled across, can be entirely exhausted by either of these two processes, supposing also, as is usually the fact, that it affords sufficient refuse for the filling.

If now we imagine the same kind of vein of the same width, but lying more flat, its tracing may be identified with the foregoing and the attack also of a stope may be profiled in offsets like a stairway laid over on side and pushed laterally. But here the miners march on the footwall itself, and not on the steps or the filling, and therefore, if the vein be narrow, they are forced to labor kneeling, or even creeping, for which reason a lode less than fifty centimetres thick in such conditions becomes unexploitable, unless it be of a quality and quantity of ore which will compensate for cutting into the surrounding rock. Besides this profile of flat stopes or steps, one other, equally methodic, may in this case be assumed for the front of work, namely, a broadway or continuous line of advance along one entire face of the mass attacked. Here the parallelopiped is mined and breached down simultaneously by all the miners who can be distributed on its development, two metres apart, all progressing abreast, propping behind and replacing much of the stulling by filling, while conserving in the filling those rolling ways which are found necessary for transportation to and from the rear.

In a flat mass, the roof evidently demands a sufficient and substantial propping and support, and if, as may happen, there be but inadequate refuse to replenish the void, as in the case of rich veins over two metres thick, where it has not been necessary to break the country rock to inscribe the dimensions of the ways, the available filling may be concentrated by building it into walls or pillars upon which the roof is allowed to subside somewhat, and which, if it sinks too low, may be cut into, over the ways, in order to give them room. If in the same case the exploited material be of little value, the exploitation reduces simply to two systems of galleries, more or less at right angles, but searching the richest parts and leaving the standing masses in pillars of three metres square for the support of the roof. These pillars may be either entirely abandoned, or some subsequent effort at robbing them may be made as will be described in another place.

TO BE CONTINUED.

THE ENGINEERING AND MINING JOURNAL.

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THE telegraphic reports in the daily papers of Wednesday announced the death of Mr. STEPHEN HARRIS, civil and mining engineer, of Pottsville, Pa. Mr. HARRIS, though still in early manhood, had made himself a name that extended beyond the State where his work was carried on. In fact, his abilities, coupled with an energetic character and thorough habits of work, made him an engineer who only needed opportunity to make himself as much respected over the whole country as among the particular circle where he was well known. Both he and his brother, Mr. JOSEPH HARRIS, Mining Engineer to the Philadelphia and Reading Coal and Iron Company, joined the American Institute of Mining Engineers, which is thus called upon to mourn the loss of another member. We were in hopes of putting Mr. HARRIS in communication with our readers, as he had engaged to contribute to our columns, but his untimely death has prevented the exercise of talents which would have made him a valuable auxiliary to the publishing profession. His death, which is reported to have been instantaneous, was caused by falling under a coal train.

Metrological Reform.

WE regret that we have not space for the publication at length of two memorials issued by the American Metrological Society, addressed to Congress and submitted for signature to all persons who sympathize with their object. In one of these memorials the desirability of a uniform system of weights, measures and moneys is set forth and reference is made to the fact that the inhabitants of France, Belgium, the Netherlands, Spain, Portugal, Italy, Switzerland, Roumania, the entire German Empire and, for purposes of foreign commerce, the Austro-Hungarian Empire also, enjoy the benefits of uniform metrological standards, and that the same is the case in all the countries of South America and in those of North America south of the United States. Great Britain and this country are almost the only ones that hang back, and there are numerous indications that they cannot long resist the general tendency. Ten years ago, the optional use of metric weights and measures was legalized by the British Parliament in Great Britain and Ireland; and in legislating for India and its population of one hundred and fifty million souls, the British authorities have actually adopted the metric system.

Congress has already taken several steps in the same direction. In 1866, the use of metric denominations was legalized and the general government has caused to be prepared and delivered to the several states accurate copies of the metric standards. Moreover, in the coinage act of last year the weights of all silver coins of the United States, except the trade dollar, are stated in metric denominations. This memorial asks for such additional legislation as shall make efficient the measures already taken, and familiarize our people with the metric system in ways not calculated to disturb their ordinary business. Laws are asked for, which shall make practicable as well as legal the use of the metric system of weights and measures in the estimation and computation of customs-duties in the custom houses of the United States; which shall make it obligatory upon the Post-Office Department of the United States to assess postages on matters transmitted through the mails in accordance with the provisions of the metric postal act of 1866; which shall require, in the reports of all the great public works conducted under the authority of the Federal Government, numerical statements involving dimensions, or quantities of any kind, to be made in metric denominations as well as in those of the metrology in common use in the country; and which shall extend this requisition to statistical and other documents involving statements of quantities, which may be issued under authority of any of the departments of the executive government.

The other memorial refers to coinage, and asks that the legal weights of our gold coinage, which are already metric within a fraction exceeded, for the smaller coins, by legal tolerance, may be made entirely metrical, so that the amount of pure gold contained in the gold dollar will be exactly one gramme and a half. This statement of the case is correct, but meager. The numerous reasons for a change are not given with sufficient fullness; nor is it pointed out, that if the gold dollar contains exactly one and a half grammes of pure gold, then a three dollar piece, nine-tenths fine, would weigh exactly five grammes. The coinage itself, therefore, as well as the amount of pure gold contained in it, would be commensurable with metric standards; and it would be easy, by printing upon each coin a statement of its weight, to make everybody familiar with the units of weight. This opens at once an easy road to international coinage. It is only necessary that the fineness of standard gold should be everywhere nine-tenths (as it is everywhere already except in Great Britain,) that the weight of pure gold in coins should be given on the coins in metrical units, and that the mints of civilized countries should do honest work. The immediate result would be, that the gold coins of nations adhering to this plan could safely be made legal tender in exact proportion to their weight. For instance, in this country foreign coins could be accepted without indirect calculations of value, on the simple principle that every three grammes of pure gold would be worth two dollars or that five grammes of standard gold would be equivalent to three dollars. And the ultimate result would be that the gramme of pure or standard gold would become the world's unit of money, superseding, by the most natural and inevitable process, all local units, or co-existing with them.

We wish these points and others that could be named had been more explicitly set forth; but in spite of such minor deficiencies we heartily coincide in both memorials and trust that they will be so numerously signed as to produce a tangible effect in legislation. A copy of each memorial may be found at this office and persons in sympathy with the objects of either are cordially invited to sign it here.

The Ringwood Excursion.

THE memorable day of all the days of the recent meeting of the Institute of Mining Engineers was certainly that of the excursion to Ringwood. To commemorate it suitably, we should require several entire numbers of the JOURNAL—and the heartless printer has just notified us that whatever we want to say must be said in 12.964 inches! The mechanical equivalent of memory and enthusiasm was never more unwelcome to us. The relation between heat-units and foot-pounds has, as is well known, destroyed many a promising invention, and all but ruined a large class in society—the mechanical geniuses. But if science is going to intrude on literature, and correlate thoughts with inches, what will become of us? Alas, even in expressing our indignation, we are using up our space! Let us devote a millimeter or two to the preliminary remark that if we had unlimited area for soul-expansion we would certainly invoke on this occasion the muses of poetry, comedy, history—yea, all the nine (for was there not tragedy, friend BL*KE, in the condition of thy shoes and stockings when thou didst arrive in front of the fire-place?) to inspire us with concentrate power.

Certainly everything conspired to render the day delightful. There was weather in abundance. Nobody ever had more of it in an equal period. The very heavens came down in small pieces. It snowed vertically, horizontally and obliquely; it blew parallels, asymptotes and epicycles; it froze ears and melted noses; in short, it did everything but stop. This is what Old Probabilities calls "clearing weather."

The adventures of the day were not less various and exhilarating. The hospitable host of the occasion had feared that the affair might prove monotonous. That was because he was not sure of the presence of fellows of such infinite resources as the melancholy P*CH*N, the boisterous DR*WN, the hipparchic C*GSW*LL (this adjective is probably Homeric, and means "one who can harness a wild steed"), the deliberate C*XE, the uninquisitive F*RMST*NE (F. smokes too much; that's what ails *him!*), the deep-bass PR*ME, the green, green H*LL*Y, the ponderous CH*RCH, the bashful PR*S*D*NT of the INST*T*TE, and the amazed and unhappy reporter of the T*M*S. (We suppress vowels, out of delicacy; but the consonance of characters described will indicate to whom we refer.) If Mr. H*W*TT had known that such an assortment of elements would be available, and that the atmospheric elements also would lend a hand to make things lively, he might have saved his last locomotive, which he smashed up on the Ring-

wood branch, just to afford an incident. It was a complete smash, and no mistake; H*LL*Y and C*GSW*LL studied the thing, and reported that it was too many for them. So there was nothing for it but to mount a loaded ore-car, and stand on the slippery magnetites in picturesque attitudes, while P*CH*N pushed. But his powers had been overestimated. In fact, many a man can carry a whole blast-furnace, with a fringe of coal-mines, ore-banks, and coke-ovens, to say nothing of finances, the tariff, and an occasional explosion, who cannot cope with the dead weight of so many engineers, all at once.

There was nothing for it but a tramp across country. The varied topography of New Jersey never was more keenly realized than on this occasion. What a lovely region to take exercise in! How much distance it contained to the mile! Some of the leisurely members pressed into service a fiery team of grays, and a sumptuous wagon—it was not a spring wagon, but a winter-wagon—and pranced slowly forward up the mountain. Those who were in a hurry walked; and at last everybody walked, except an invalid or two.

Who will ever forget how we stood on the perilous edge of the Ringwood mines, a company of Rip Van Winkles, with ice hanging from beard and moustache, like moss on ancient Druids? (*Did* the Druids wear moss that way? No, no; you misunderstand us. What we said was *ruins;* but the excursion to Ringwood has left us with a cold in the head.) The surface-geology of this part of New Jersey is exceedingly simple. It consists of a vast, uniform deposit of crystalline mineral, shown by analysis to be hydrogen anhydride. Characters: G= 0.9178; H=1; cryst., hexag., stellar; chem. comp., H_2O; before blowp., oxidizing or reducing fl., disappears. This stratified crystalline rock (the only one, we believe, that H*NT has never "gone for") rests unconformably on pretty much everything. The survey of New Jersey contains no mention of it—doubtless on account of the summery way in which the field-work has been performed. But the Institute was able to study even the manner of its deposition. It is a product of precipitation from atmospheric suspension, just as was the primeval mass of the earth itself. Only things were warmer then.

Judging from the extent of the surface indications, there is a vast area of country here which is all alike. Now, by cutting into it at a good many places, it has been found that iron ore, in inexhaustible quantity and unsurpassable quality, underlies it. An experienced mining engineer will at once conclude from present observation that the whole of this area is but the top of a solid mass of ore. The remaining calculation is simple. We walked that day 1000 miles, according to the unanimous opinion of experts. But say 500, so as to be on the safe side. The width of the country is very great. We could occasionally see half a mile in a single direction. Say a quarter, for safety; two quarters make a half, hence in two directions we could see half a mile. Hence, area of iron-beds 250 square miles. Depth unknown; but mining is inconvenient after 2000 feet; hence, depth 2000 feet. Grand ferruginous total, assuming specific gravity of magnetite at 5, and throwing out odd thousands, etc., for safety, about two million million tons of ore—the relations of which to the national debt are at once evident. New Jersey could pay that debt (ironically) and never know it.

After collecting the materials for the above opinion, the Institute visited the grave of ROBERT ERSKINE, the chief engineer of the American Army during the Revolution. He was at one time manager of the Ringwood property, and proved himself an honest as well as an able one. The story of his life will some day be told by the present owner of the spot which holds his grave, who is both worthy and willing to commemorate his virtues.

Here comes that inky boy, to say that V says that C says that B says he can't take any more Brev. matter. (Brev. means brevier, not brevity.) And we haven't told of the Ringwood Mansion, the lunch (but that's all gone, anyhow) the dairy and the Alderneys, the jovial ride to the railroad, the hymns that that *T*m*s* reporter *would* sing, in spite of us—in fact, we haven't begun. But we give up in despair, and hereby notify the Institute of Mining Engineers that the whole salary of the President of the Institute wouldn't pay for the labor of trying to write up one of their whimsical, funny, terrible, profitable, indescribable and inimitable excursions; and hereafter we shall not make the attempt.

American Institute of Mining Engineers.

SECOND SESSION, THURSDAY MORNING, FEBRUARY 26, AT 10 A. M.

The President read, in the absence of the author, the following paper by Mr. J. M. LOCKE, of Cincinnati, on the Brückner Revolving Roasting Furnace.

Mr. RAYMOND inquired of M. BRÜCKNER, who was present, whether his furnace had ever been used in connection with the Plattner Chlorination Process.

Mr. BRÜCKNER—No, I think not; solely in the amalgamation process.

Prof. EGLESTON inquired how much fuel was employed in the furnace and what the dimensions of the fire-place and roasting chamber were.

Mr. BRÜCKNER—The fuel is three-quarters of a cord of wood or three-eighths of a ton of coal. The fire-place is 5x2 feet; height of roof, 2 feet; the roasting cylinder, 5½ feet in diameter, and 12 feet long; thickness of lining, 6 inches.

Mr. RAYMOND remarked that, as regards effectiveness of roasting, the Brückner cylinder would compare favorably with the Stetefelt furnace, and possessed the advantage over the latter in its adaptability to varying supply of ore, as well as to size of mill.

Prof. EGLESTON dwelt on the point made by Mr. RAYMOND. He remarked that in no respect was the progress of metallurgic science more marked than in the introduction of special machines to do special work. The day has passed when a large steam engine is put into a mill to drive all its machinery. That may be more economical when everything is working, and working well, but the economy disappears when a thousand horse-power engine has to be used to operate a few stamps or pans.

Mr. BLANDY remarked that in the Lake Superior copper region heavy stamps were generally replacing the lighter stamps. The capacity of a mill was increased largely thereby. Here, however, machine shops and skilled mechanics are on the ground, a condition not generally to be found in Western mining regions.

Mr. RAYMOND gave an illustration in the history of a combination mill built in Southern Nevada.

THE BRÜCKNER REVOLVING FURNACE.

By J. M. LOCKE, C.E., Analytical and Consulting Chemist.

BRÜCKNER'S Revolving Cylinders for roasting ores, etc., are now used at a number of the mills in Colorado and New Mexico, for the purpose of roasting and chloridizing silver ores, with highly satisfactory results, even from those cylinders of small size, erected before the many improvements of recent date.

As examples of the larger improved cylinders, reference can be made to those erected at the Tennessee Reduction Works, Silver City, Grant County, New Mexico, and those which were built, in 1871, at the celebrated Caribou Silver Mill and Mines, Colorado, a mining enterprise which has proved so satisfactory as to have been lately sold to a Holland Company for an enormous amount.

DESCRIPTION OF THEIR CONSTRUCTION.—These cylinders, as now constructed by Messrs. LANE & BODLEY, of Cincinnati, Ohio, are shown in the accompanying cuts—(see Supplement)—in which Fig. 1 is an elevation in perspective, Fig. 2 a longitudinal, and Fig. 3 a transverse section.

The exterior of the cylinder is a shell of boiler iron, 12 ft. long by 5 ft. 6 in. in diameter. The ends are partially closed with similar material, leaving in the center a circular opening about 2 ft. in diameter, bounded by a flange projecting several inches. Upon one side is placed an opening closed by a hinged door. Upon the outside of the cylinder are bolted three bands, as shown in Fig. 1, in which the section of the first is square, and that of the third semi-circular; the second, or middle band, is a strong spur gear. Passing through the cylinder are six pipes parallel to one another, in a plane at an angle of 15 deg. to the axis of the cylinder; these pipes also lie in this plane at an angle of from 30 to 35 deg. to the longitudinal axis of the plane, as shown in Fig. 2, where the internal arrangement of the cylinder is seen, a perforated diaphragm being formed through part of the cylinder by means of perforated plates placed between the above described pipes, the plates being held in place by longitudinal grooves upon these pipes.

The entire cylinder is lined with brick (common building brick have been found to answer the purpose very well), the brick being placed in the following manner: The entire side of the cylinder is covered with one layer, laid flatwise, thus forming a lining about 2½ in. thick; there is an additional layer extending from each end of the cylinder about 15 in. to the center of where the nearest pipe passes out; then additional concentric layers are added thereon, until the circle is contracted down to the size of the opening in the end, which is also lined, and each layer falls short of the preceding one about 2 in., thus giving the end linings a conical form, the entire lining being laid in a mortar of one part fire clay, two parts pulverized old fire brick, and water, all thoroughly mixed and beaten. The cylinder is supported upon four large friction rollers, two of which are grooved upon their periphery, to loosely fit the semi-circular band, thus holding the cylinder longitudinally in place. The other two friction rollers are made without a groove, and bear upon the square band, thus accommodating themselves to the expansion and contraction of the cylinder, or any irregularities of form, all of which can be seen in Fig. 1. Rotary motion is given to the cylinder by means of a pinion placed under the cylinder and gearing into the spur gear band. Upon the other end of the pinion shaft are placed two bevel wheels, into which gear two match wheels, which latter are loose upon the driving shaft, standing at right angles to the pinion shaft, and either of which wheels can be attached to the driving shaft, thus communicating the speed of revolution of one or the other of the bevel gear as may be desired. Inasmuch as by wear, or settling, the axis of the cylinder may possibly be thrown out of the proper line, the following means of adjustment are provided, but not shown in any of the figures, viz.: Each journal box of the friction rollers is held in position by adjusting screws, by which it can be moved horizontally to or from the center line of the machine, thus giving entire control of the lateral and perpendicular adjustment of the cylinder which they support.

The circular flange of one end of the cylinder loosely projects into a fire-box, best seen in section to the left of Fig. 2. The other end projects into an opening communicating with dust chambers and a chimney. There is placed in the bottom of the flue a shoe projecting into the cylinder, which catches such dust as may fall back, and returns it into the cylinder in lieu of allowing it to escape through the crevice between the cylinder flange and opening into the flue. A door is placed in the flue opposite the opening, through which the interior of the cylinder and its contents can be readily examined at any time.

METHOD OF OPERATING THE CYLINDER WITH REFRACTORY SILVER ORES.—A fire having been kindled in the fire-box, the cylinder is allowed to slowly revolve until heated to a dull red, and is then brought to rest with the door on top. In this position about 4000 lb. of pulverized ore, and 200 to 400 lb. of salt are introduced; the door is closed and securely fastened, and the cylinders are made to revolve at the slower speed of from one-half to one turn per minute. The fire is so regulated that after an hour's time the sulphur contained in the ore commences to burn, the ore in the cylinder being retained at a dull red for some

time. (In those ores containing a large amount of sulphur, little or no additional fuel is required for desulphurization.) During the whole of this and the subsequent operation, the inclined perforated diaphragm causes the heated ore to traverse alternately backward and forward the entire length of the cylinder, also sifting it through the flame, thus insuring a uniform heating, mixing, and exposure to chemical action.

The diaphragm, in the meantime, is protected from destructive action of heat by the cooling effect of the external air circulating through the pipes, and from corrosion by the formation of a basic scale, or coating, resulting from reaction of the iron pulp, etc.

The desulphurization being completed, the heat is gradually augmented to a full red. The pulp soon assumes a spongy appearance, technically known as "wooly," in consequence of the double decomposition of the sulphates (formed during desulphurizing) and salt (chloride of sodium), liberating chlorine gas, etc. After an hour's time, or as soon as a sample taken from the cylinder evolves the odor of chlorine uncontaminated with that of sulphurous acid, which indicates that the chlorination is complete, the door in the cylinder is opened, and the cylinder revolved by the more rapid moving gear, and the chloridized ore is quickly discharged, being received into a car, shute, or other conveyor, according to the construction of the mill.

The door in the back of the flue furnishes a ready means for sampling and examining the condition of the ore in its progressive stages, and in some cases the salt is not added to the ore until subsequent to desulphurizing, in which case this flue door is conveniently used.

OTHER USES OF THE CYLINDER.—The cylinder has been found to give excellent results in roasting the compound auriferous pyriti ores to be treated by the Plattner process, in which case a small quantity of charcoal is subsequently introduced to the charge, so as to facilitate the decomposition of the resultant sulphate of copper. This form of cylinder is undoubtedly well calculated for the manufacture of soda from cryolite, roasting cement, plaster of Paris, ores of zinc, lead, copper, etc. In a word, it is admirably adapted to most of the roasting and reverberating furnace operations.

COST, WEIGHT AND CAPACITY OF THE BRÜCKNER CYLINDERS.—The cost of a cylinder, including its supporting and rotating machinery, iron work for fire box, bolts for foundation, and all royalties on patents, is about $2100. The total weight of the foregoing parts is 16,000 lb., the placing of the foundation and erection of brick work, for fire box, cylinder linings and dust chambers, will vary greatly according to local circumstances. The capacity of a cylinder in 24 hours is, as reported by Mr. CHAS. E. SHERMAN and endorsed by B. O. CUTTER, from 8 to 10 tons (in very refractory ores the daily average would be less, J. M. L.), the chloridizing being up to 96 per cent. These statements are based upon their experience at the Caribou Mill, Colorado. H. D. BREED Esq., proprietor of the same mill, gives the actual total cost of roasting and chloridizing at $5.50 per ton. This low cost renders it feasible to work with profit very low grade ores. After examination of what has been stated in regard to the cylinder, by Prof. RAYMOND, U. S. COM., (1); CLARENCE KING, in charge of the Geological Survey of the 40th parallel (2); KÜSTEL (3); BURLINGAME, Superintendent of the Tennessee Mill, Silver City, N. M. (4); A. WOLTERS, at present Superintendent U. S. Mint, Boise City, Idaho (4); H. STOELTING, at present Territorial Assayer of Colorado (4); Prof. DANBY (5); CHAS. E. SHERMAN (6); B. O. CUTTER (6); and A. D. BREED all of the Caribou Mill, Colorado; and an examination of the improved cylinder, as now manufactured, I am convinced that it possesses the following advantages:

1st. A most thorough and uniform accomplishment of its work.

2nd, A complete control of its action irrespective of the character of the material acted upon.

3d. A high percentage of chlorination and, therefore, of yield, with ores of the precious metals.

4th. Low cost.

5th. Little wear and tear and ease of repairing.

6th. Skilled labor is not a requisite in its management.

7th. The size of the apparatus permits it to be readily adapted to the size of a mill by simple reduplication.

(1). Report 1871, Pages 376 an d748, see appendix.
(2). " Geological exploration of 40th parallel, Vol. III., Page 610.
(3). Letter to Robert Peats, 1870.
(4). Report on Brückner's cylinders.
(5). " " Caribou Mill, published in London.
(6). The Caribou Silver Mine and Mill, Boulder Co., Colorado, U. S., with reports, maps, etc., London. Printers, G. M. M. Taylor & Co., 169 High Holborn C. W.
(6). Letter by Chas. E. Sherman to B. O. Cutter, June 21st, 1871.

Notes upon Hydraulic Forging,

AS PRACTICED AT THE IMPERIAL STATE RAILWAY WORKS, VIENNA, BY W. P. BLAKE.*

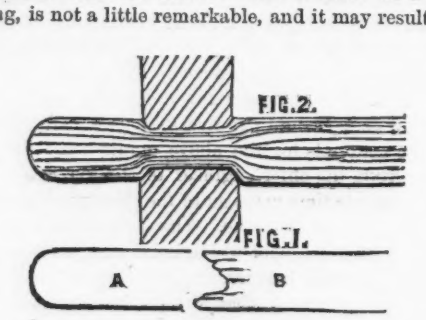
FORGING under the hydraulic press, which was introduced by HASWELL in the year 1861, at the machine shops of the Imperial State Railway Company of Austria, has since been greatly improved, so that at the present time there are very few parts of machines which cannot be produced in this way, and at no greater cost than iron castings. The process is now used at Vienna chiefly for such parts of locomotives as cross-heads, link-bars, axle-box frames, etc., especially where the form is intricate, and there are many angles and projections. These objects weigh from 50 to 150 lb. or more, and it is claimed for them that they are not only so much cheaper than ordinary forgings, but are much more regular in form and stronger.

The results which Mr. HASWELL has attained, after years of patient experimenting, were well shown in the Austrian Department of the Exhibition by a collection of the pressed objects in iron and steel, just as they left the molds, with some of them cut asunder longitudinally and the surfaces etched, so as to show the internal structure or direction of the grain. Through the courtesy of Mr. HASWELL and his son, I saw the presses in full operation at the works, drawing down large Bessemer ingots, cutting them up, and forming various parts of locomotives.

They have two large hydraulic presses in use; the largest, with a piston 24 in. diameter, gives 1,200 tons pressure, and the second, with an 18 in. piston, gives 600 tons pressure. The pressure in the pumps is 600 atmospheres. The action is vertical; the piston descends upon the work, and for forging ingots is armed with a hammer-like head. An ingot of No. 7 soft Bessemer steel which was forged in my presence weighed 2,030 lb. One end being placed upon the anvil, the piston is brought slowly down and crowded into the mass as if it were putty or dough, forcing it each way, but chiefly in the direction of the length of the ingot, this being the narrowest section of the anvil and hammer. The piston is then raised and the ingot is moved forward for a second squeeze, and so on until the first half has been reduced in thickness, when it is turned on edge and the operation is repeated. It is then turned end for end and forged until the whole length has been reduced to the required size. It is cut into masses of the proper length by a chisel forced through the bar by the press.

There is no noise or jar in the whole operation, which requires less time than the ordinary method of hammering or rolling. The pressure affects the very center of the mass of the ingot. Its action is by no means superficial, and it is evidently far more effectual in modifying the structural condition of the bar than blows on the surface can be. There is no distribution of the force of the blow by the vibration of the foundation of the anvil and the surrounding objects, as there is with the violent impact of a steam hammer. The ingot yields gradually and bulges at the sides and ends, *a*, and is not drawn out more on the surface than at the center, so as to give a ragged hollow end, as is usually formed under the hammer. Before the forging is completed, a distinct structural arrangement parallel with the bar becomes evident, and is most distinctly seen when the steel moves under the press. Thus, as the piston-head sinks into the steel, the lines of structure visible in the sides bend downwards.

The appearance of such structure so well marked in a cast ingot, without piling or folding, is not a little remarkable, and it may result in great part from



the peculiar conditions of pressure. It is apparently a linear arrangement of the crystals, or possibly it, in part at least, results from the flattening and drawing out of the numerous blow-holes found radially disposed in Bessemer ingots. The lines or layers mark a difference in chemical composition. It has been shown by BELANI* that the percentage of carbon varies in different parts of hammered or rolled Bessemer steel, and he regards this variation as due to the pressure. But from whatever cause it originates, this structure, or "grain," is an important factor of strength in pressed forgings, and may be said to characterize them, as will presently be shown. Bessemer steel works better in this way than cast-steel, which is more liable to split up.

The masses cut from the forged ingots are taken to a heating furnace and are made nearly white hot, preparatory to the operation of pressing. The molds or dies which are left open at the top, are made in several parts, if necessary, and are securely held together by bands of wrought iron. A plunger-head or follower, called by the workmen "the stamp," is attached to the piston and descends into the cavity of the mold. The shape of this plunger-head determines the shape of the inside of the object to be pressed. All the parts being properly adjusted and the inside of the mold and the surface of the plunger being smeared with thick oil, a block of hot steel is thrown into the cavity, the plunger descends and presses the steel each way into all the angles and recesses of the mold. The excess of the metal, if any, rises on each side of the plunger and protrudes. This can afterwards be cut off, but a little practice enables them to cut the blocks of

* Extract from Report on the Iron and Steel of the Vienna Exhibition. Read at the Meeting of the American Institute of Mining Engineers, February 26, 1874.

* *Kaernthner Zeitschr.*, 1873, p. 9; also, Jour. Iron and Steel Inst. Gr. Brit., I., p. 242. On etching surfaces of hammered and rolled steel, some portions are more rapidly acted on than others. Analysis shows that the parts most rapidly acted on, *i.e.*: having the greatest affinity for oxygen, are less rich in carbon than the parts less acted on. BELANI thinks that the carbon is concentrated by pressure. An important subject of inquiry is here opened, viz.: the effect of pressure upon the quality of steel or iron and the strength of forgings of equal size made by hammering or by hydraulic pressure or rolling. The purely physical aspects of the question of structure produced by pressure, are no less interesting, and there are many geological phenomena which are cognate.

the proper weight so that there is but little waste. When the plunger has reached the proper depth, the key which attaches the head is knocked out, the piston is raised, and the mold and contents removed from under the press. A few blows of the sledge liberate the forging which is thrown aside to cool. If the work is well done all the angles are full and solid. All pieces of this same kind are alike in dimensions, and there is no great excess at any part to be cut away. The labor and cost of fitting up such forgings are much less than with those made in the ordinary manner.

The structural peculiarities already mentioned are most distinct in the pressed forgings made from piled iron masses, and are beautifully shown by the etched sections. The lines of grain conform in a remarkable degree to the form of the mass, winding in and out around the curves and angles in such a manner as to give the greatest strength where it is most needed. These lines show in a very interesting way the flow of the viscid metal under the pressure. A few prints taken directly from the etched surfaces will make this clear. Experience showed that very sharp angles in some parts of a mold interfered with the proper flow of the metal. The difficulty was removed by rounding off the angles or by building them out so as to give more space for the flow. The superfluous metal is afterwards cut away, leaving the internal curves of the grain in the best shape for strength.

The rapidity with which intricate forgings are made is one of the greatest advantage of the method. Of such objects as cross-heads for locomotives, 25 to 30 can be made in a day. The molds are made of cast iron and are used cold. The plungers are generally cast, and duplicates are kept on hand for use in case of breakage, which is not unfrequent. The process is also successfully applied to the forming of boiler heads, steam domes, etc., the large plates of Bessemer steel being forced through a ring.

A great number of spokes for locomotive wheels are also manufactured. The total production of pressed forgings in these works for nine months was 7830 pieces, weighing 1,071,200 pounds. Mr. HASWELL has published one or two notices of the process in the technical journals of Vienna.

While the author was reading this paper, prints taken from etched forgings were passed around, and excited great interest. President RAYMOND remarked on the importance of this method of forging as evidenced by the collection exhibited at Vienna. Prof. BLAKE added that Mr. HASWELL told him the curiosity of the visitors to the exhibition was so excessive that he was compelled to refuse permission to visit his establishment to most of them, as his works were completely overrun with curious sight-seers. In spite of a rigid system of inspection, his workmen constantly found interlopers in the works, who had made their way there in some kind of disguise.

Determination of Sulphur in Pig Iron and Steel.

DR. THOMAS M. DROWN.*

THE method usually employed in accurate determinations of sulphur in pig iron and steel is to treat a weighed sample of borings in a flask with muriatic acid, and to pass the gaseous products through an alkaline solution of lead or silver, which precipitates all the sulphur of the sulphuretted hydrogen in the form of sulphide of lead or silver. The sulphide thus formed is subsequently oxidized by aqua regia, bromine, or other oxidizing agent, and the sulphuric acid formed precipitated in the usual way by chloride of barium.

I have substituted for the alkaline metallic solution, a solution of permanganate of potash in the strength of 100 grammes of permanganate to 200 cub. cent. of water, and find that it gives results quite as accurate as those obtained by using an ammoniacal solution of silver. By the employment of the permanganate, it will be readily seen, that there is considerable saving of time and work. In order to test the accuracy of the method, six samples of pig iron borings were weighed out (about six grammes each), and treated identically in the same way, with the exception that with three an ammoniacal solution of silver was used, and with the remaining three a solution of permanganate of potash. The sulphide of silver formed was filtered and oxidized by bromine water. The residues, after treatment with muriatic acid in the flask, were invariably filtered off and washed, then evaporated twice to dryness with aqua regia, taken up with muriatic acid, filtered, and the filtrate added to the main solution containing the sulphuric acid. In using the permanganate, I have found it necessary to avoid a very rapid evolution of gas. It is also necessary to pass the gas through at least three tubes or bottles containing the solution of permanganate. The gas then gives not the slightest blackening when passed into a lead or silver solution. After the evolution of gas has completely ceased, and air has been drawn through the apparatus for some time, the contents of the bottles are poured into a beaker, rinsed out with water, and any oxide of manganese adhering to the sides, or to the tubes, dissolved in a little muriatic acid. Enough muriatic acid is then added to the beaker to completely decompose the permanganate and convert it into a clear, colorless solution, in which the sulphuric acid may be directly precipitated. If the solution does not become perfectly clear, owing to impurities in the permanganate used, filtration is necessary before precipitation.

The following are the results obtained by the two methods :

WITH SILVER SOLUTION.	Per cent.	WITH PERMANGANATE.	Per cent.
No. 1	0.100	No. 4	0.093
No. 2	0.093	No. 5	0.098
No. 3	0.099	No. 6	0.091

The sulphate of baryta, after weighing, was fused with a little carbonate of soda and potash, and the sulphuric acid reprecipitated, giving :

	Per cent.		Per cent.
No. 1	0.0900	No. 4	0.0880
No. 2	0.0890	No. 5	0.0920
No. 3	0.0920	No. 6	0.0850
Mean	0.0903	Mean	0.0883

The difference in the two means is but 0.002 per cent.

The pig iron used contained an unexpectedly small amount of sulphur. It was made from a brown hematite resembling a bog ore, occurring in vast quantities at Katahdin Furnace, Piscataquis County, Maine, containing three per cent. of sulphuric acid.

* A Paper read before the American Institute of Mining Engineers, February 28, 1874.

Engineering and Mechanical Notes.

EXPLORING IN LAKE SUPERIOR.—The Lake Superior *Mining Gazette* says that "the present outlook indicates that there will be a considerable number of 'exploring' expeditions on foot in our woods the coming spring. A good deal of work of this kind will probably be done in the so-called Ontonagon silver region. That district seems to be a mineral one, at least so far as indications are concerned—and its thorough testing at the earliest possible day is a thing for congratulation. The existence of the Mineral Ridge Railroad adds immensely to the prospective value of that portion of the range, now unoccupied, lying between the Pontiac and Osceola mines ; and we expect to see this highway taken advantage of to facilitate and simplify the organization and starting up of mines in the direction indicated. A good deal of thorough exploration, no doubt, will be carried on, north of the Schoolcraft, as far as the Seneca mine. It is reported that men are to be put into the woods on this—the south—side of the lake, between the Dodge mine and the Ontonagon County line, to confirm, if possible, the location of a rich deposit of copper said to exist in that vicinity. The iron and slate regions of the eastern end of Houghton County are also to be well searched and opened out."

FISH IN A HOT SPRING.—A correspondent of the *Scientific American*, writing from Elko, Nevada, says that there is a hot spring there, in which numbers of fish can be seen swimming about, though the water is so hot that eggs are cooked in it in "less than three seconds." The explanation of this phenomenon is that the hot springs rise in the banks of a stream, the water of which is intensely cold. This cold water runs on the bottom, without mixing much with the hot water, and the fish avoid cooking by keeping in the bottom layer. The correspondent says "a test of the water above the hot springs showed a mean temperature of 42°; fastening my thermometer to a pole, I immersed it above the influx of hot water ; and keeping it as near the bottom as possible, I moved it gradually down stream. The result was a very low temperature at the bottom, gradually rising to 65° until I reached a point (a fourth of a mile down the stream) where the temperature became uniform throughout. This stream is one of the many that form the head waters of the Columbia River ; and to this point, over eighteen hundred miles from its mouth, in the spring and fall, the salt water salmon come in hundreds to spawn."

THE ECONOMICAL CONSUMPTION OF COAL ON LOCOMOTIVES.—The Lancashire and Yorkshire Railway Company are fitting up several engines to use WARSOP'S apparatus, which he calls the "Aëro Steam Engine." This appliance is simply the introduction of heated air through perforated pipes lying along the bottom of the boiler. The air is forced in by means of an air pump, driven from the main cross head, and the air is forced through a coil of pipes fixed in the smoke box, into the boiler, at a temperature of upwards of 600° Fahrenheit. A saving of 12 to 15 per cent on fuel is claimed, and also that this appliance prevents the deposition of sediment or scale in the boiler.

COLLIER'S WAGES IN FRANCE.—Statistics are published by the Society of Mineral Industry at Douai, in the North of France, showing that since the great rise in the price of coal, the average wages earned during a period of two months, by 5,000 colliers working at eleven different mines, was 5f. 22c., or say $1.05 gold per day each. As the price of coal declines, it is probable, these rates of wages will also be reduced. The production of coal in France, for the year 1873, is estimated at 16,500,000 tons, or about 2,000,000 tons more than the preceding year.

WE desire to call attention to the advertisement of Mr. BENJAMIN, importer of all kinds of laboratory, assaying and chemical apparatus, minerals and models. Mr. BENJAMIN is one of the most active dealers in chemical supplies in this city, and the only one from whom much of the material necessary for work with the standard Freiberg blowpipe apparatus can be obtained.

Coal in India.

The *Rangoon Times* states that there are on the Khosia and Jamtia hills sixteen known fields of coal. Of these, the Lackadong field is one both considerable and accessible. It is 86 miles from Cuttack, Dr. Oldham estimates the field to contain 1,500,000 tons of coals, of a good quality, giving out great heat, first-rate for gas, and only 5 or 6 per cent. below good English coal. The Lieutenant-Governor of Bengal has directed a survey of the field, and the preparation of a scheme for bringing the coal down to Borghat; and delivering as an experiment some 3000 maunds of it for use on the Government steamers.

THE COAL TRADE.

NEW YORK, March 13, 1874.

The dullness we have had to record for many weeks past in the demand for immediate delivery is still maintained for all kinds of coal. The few cold days of this week have scarcely produced any noticeable effect on the market for house coals, and the same inactivity continues in all branches of manufacturing business to which we look for our coal market. Such of the furnaces as are in blast are buying regular supplies, but none are disposed to lay in a large stock, being satisfied that the mines will be worked with regularity, and that they can get their coal when needed. The dealers generally report a fair amount of contracts being made for season delivery, but very little being done for immediate. The expectation is, nevertheless, very generally entertained that the year will be a good one, and that with the opening of navigation business in all branches must revive. The quantity of coal coming to tide-water is still small, though somewhat increased by the strike on the Pennsylvania and New York Railroad at Waverly, N. Y., which is stopping the shipment of coal north on that route.

At *South Amboy* the receipts of coal for last week were 22,531 tons, and the shipments 10,769 tons.

At *Port Richmond* no coal was received, and 14,000 tons shipped, leaving on hand 57,000 tons. On Monday last, coal was again received at Port Richmond, the alterations in the Reading Company's track being sufficiently advanced for that purpose, as announced by us last week.

The total *production* of anthracite coal for the week ending March 7 was 286,570 tons, as against 247,068 tons the preceding week. For the amount mined on the line of each road see our table of production in another column; this gives the amount *actually mined*, less what is used at the collieries, and is the only statement published that gives the actual product of our anthracite mines.

Our bituminous coal trade will not open much before the first of April, and as there are still stocks at the principal points of consumption, there is not much doing beyond booking contracts for future delivery. This is being done to a considerable extent, and there is a prospect of an active trade in this line, and particularly in our American coals, which the tariff of 75 cents per ton enables to compete successfully, even as far north as Boston, with the nearer and cheaper mined Provincial coals. Prices of Provincial coals have been made as follows, for delivery f. o. b., at the mines: Glace Bay and and Caladonia, $2 25, gold, per ton; Lingan, $2 75; Pictou $3 00; Sidney, $3 00; Gowrie, $2 25; and Block House, $2 25. Freights will probably not exceed $4 to $4 25 per ton, add duty and waste, and if bituminous coal retails in *Boston* at $8 50, as is expected, there will be but little margin for handling. If the duty of 75c., gold, should be repealed or lessened, as is moved every year in Congress, some of the better varieties of Provincial coals, though generally inferior in quality to our best native fuels, would yet make strong competitors in our markets as far south as Philadelphia. The prices for bituminous coals are expected to increase, as the season advances, in sympathy with anthracite.

The trade in all the large markets, both East and West, is quiet, and prices remain, for the most part, unchanged, as will be seen by reference to our very full reports in other columns.

THE following circulars of the Philadelphia and Reading Railroad Company, relating to freights, toll charges and drawbacks on coal, were referred to in our last week's issue:

PHILADELPHIA, March 2.

(CIRCULAR NO. 1.)

Drawbacks on Contracts.

If any written contracts are made with consumers or retailers for lump, steamboat, broken, egg or chestnut coal (at a fixed price to be named in the contract), deliverable in equal monthly proportions, beginning either on the first of March or first of April, to be shipped from Port Richmond, consigned to any points whatever, and if such contracts are filed in the office of the company (in accordance with the rules relative to drawbacks on contracts) before the first day of April next, there will be paid upon all coal shipped from Port Richmond to fill such contracts prior to the first of February next (provided such coal is shipped in accordance with the rules relative to drawbacks on contracts aforesaid), such a sum as drawback as will reduce the tolls from Port Carbon upon lump coal to 16-42; upon steamboat coal to 16-43; upon broken to 17-44; upon egg to 170-455, and upon chestnut coal to 16-34 of the price at which the coal is sold on board at Port Richmond; provided that the net rate of tolls, after payment of drawbacks, shall not be less than $1 60 per ton from Port Carbon on lump, steamboat and chestnut coal, and $1 70 per ton from Port Carbon on broken and egg coal; provided further, that upon the presentation of any such contract for filing as aforesaid, the company shall have the right to determine whether the purchaser named for such contract is a consumer or a retailer, within the meaning of the terms as herein used.

The words "deliverable in equal monthly proportions," contained above, are not to be construed to require deliveries in equal monthly proportions to extend throughout the entire season, or until February 1, 1875, but all lump, steamer, broken, egg and chestnut coal delivered in March can have the benefit of all the contract rates; and all contracts for delivery after April 1 may be filled in any given number of months, provided the deliveries begin in April and continue in equal proportions during each succeeding month till filled. For example: A contract for 10,000 tons may be delivered entirely in April—or half in April and half in May, or one-third each in April, May and June—and so on.

(CIRCULAR NO. 2.)

If any written contracts are made with consumers or retailers for lump, steamboat, broken, egg, or chestnut coal, at a fixed price to be named in the contract for the coal delivered at the wharf, in equal monthly proportions, beginning on the 1st of April next (exclusive of the cost of unloading, which is to be paid by consignee), and the coal so sold is shipped from Schuylkill Haven, via the Schuylkill Canal, before December 31st, consigned to New York City, points upon Long Island Sound, or on the Hudson River, and if such contracts are filed in the office of this Company, in accordance with the rules relative to drawbacks on contracts, on or before the 1st of April next, such a drawback will be paid as will reduce the charges for tolls and transportation upon such coal to one-half of the price at which the coal is sold at the wharf, at its destination, exclusive of the charge for towing from New York City; provided that the minimum rates of freight and tolls on lump, steamboat, and chestnut coal shall not be less than $2.50 per ton, and on broken and egg coal $2.60 per ton, from Schuylkill Haven. If the coal is sold to be delivered at any of the places below named, on Long Island Sound or the Hudson River, the following amounts will be deducted from the price at which the coal is sold before the division is made; provided that no such deduction is to have the effect of reducing the minimum rate of freight and tolls on lump, steamboat, and chestnut coal below the sum of $2.50, and on broken and egg coal, $2.60; and provided further, that upon the presentation of any such contract for filing as aforesaid, the Company shall have the right to determine whether the purchaser named for such contract is a consumer or a retailer, within the meaning of the terms as herein used.

ON THE HUDSON RIVER.

	per ton.		per ton.
Manhattanville	8 c.	Haverstraw	17 c.
Spuyten Duyvel	9 "	Verplanck's Point	17 "
Yonkers	10 "	Peekskill & Newburg	18 "
Hastings	11 "	West Point & Cold Sp'g	20 "
Piermont & Dobbs Ferry	13 "	Poughkeepsie	22 "
Nyack & Tarrytown	15 "	Rondout	23 "
Sing Sing	16 "	Hudson	25 "
Croton Landing	17 "		

ON LONG ISLAND SOUND.

	per ton.		per boat.
Norwalk & Bridgeport	33⅓ c.	Port Morris	$20 00
New Haven	33⅓ "	West Farms, mouth of Creek	25 00
Derby ($50 per b't extra)	33⅓ "	West Farms	35 00
Southport & Westport	40 "	West Chester	30 00
Milford	40 "	College Point	25 00
Branford	45 "	Flushing & White Stone	30 00
New London	60 "	East Chester Town Dock	60 00
Middletown	65 "	New Rochelle & Glen Cove	50 00
Norwich	68 "	Mamaroneck & Port Chester	70 00
Hartford & Stonington	75 "	Greenwich, Stamford & Darien	75 00
Mystic	75 "		
	per boat.		
Harlem	$18 00		
Mott Haven	18 00		

All contracts for coal delivered in New York Harbor or Long Island Sound, or on the Hudson River, which would be entitled to be shipped under the provisions of Circular No. 2, may be filled either by canal or by shipment from Port Richmond; and if shipped from the latter place, the sum of one dollar per ton, plus the proper amount per ton for towage, as shown on Circular No. 2 (provided the coal goes beyond New York), will be deducted from the price at which such coal is sold at the wharf, before the division is made, under the provisions of Circular No. 1, to determine the rate of drawback to be paid on such shipments from Port Richmond.

On all coal shipped from Port Richmond to fill any such contracts as those above referred to, the rate of freight from Port Richmond to New York, alongside in company's boats, will not be increased beyond the sum of one dollar.

The Wilkes Barre Mine Fires.

Our advices from Wilkes Barre are not encouraging as to the prospect of extinguishing the fires in the mines near that place.

The Old Baltimore Mine of the Delaware and Hudson Canal Company, having caught fire by a fall which effectually prevented all access to the fire, has had no let or hindrance to its extension and burns, as the local papers have it, "like a volcano." We understand measures are being taken to "cut off the fire" or confine it to the limited area that has "fallen in."

The Kidder Slope fire of the Lehigh and Wilkes Barre Coal Company has assumed a very serious aspect. The indefatigable efforts that have been made for the past two months to extinguish the fire by playing water on it, have not been successful.

The Wilkes Barre *Record of the Times*, a very reliable paper on local subjects, tells us that a large area of the mine has "caved in" by the weakening of the pillars. The difficulties encountered in extinguishing a fire in the mines can only be appreciated by those who have had experience in it. 1st. If a strong draught of fresh air is not provided in the immediate vicinity of the fire, the gases from the combustion of the coal will prevent the men from approaching the fire near enough to throw water on it. 2nd. If a good ventilation is provided, the fire spreads more rapidly at one point than it can be extinguished at another; and finally, when it is possible to play water on the fire, the coal in the pillars breaks off till they become so weakened as to give way altogether and let the roof down, and this effectually prevents access to the fire, and leaves the only thoroughly effective remedy: to cut off the burning district by walls and earth packing, or other manner as the circumstance may dictate. The great energy shown in endeavoring to put out this fire with water will now, doubtless, be turned to confining it to a limited area.

We learn that the Lehigh and Wilkes-Barre Coal Company has made arrangements for boring a nine-inch hole 350 feet deep, with the diamond drill, and proposes carrying steam down through a pipe to the underground hoisting engines. This will take away one fruitful cause of accident—underground boilers—in these mines—the cause of both the fires above mentioned.

The Fire in the Prospect Shaft of the Luzerne Coal and Iron Company is supposed to be extinguished, the shaft having been filled with water. As the chambers are higher than the foot of the shaft, the air would be compressed in them, and if the fire had extended up to a point beyond which the water would rise, it may still happen that the fire will break out again when the water, which now stands one hundred feet high in the shaft, is pumped out.

The miners' strike in Tioga is ended, the companies agreeing to the terms of the miners.

The Lehigh and Wilkes-Barre Coal Company resumed work at Ashley and Sugar Notch on Monday, the 2d of March, after a two months suspension. The company and men have signed an agreement on the 1873 basis, for the remainder of this year.

Summit Hill Items.

From Mauch Chunk Gazette.

On Monday last, work was resumed at the breakers and at the screen building of the Lehigh Coal and Navigation Company, leased and now worked by the Lehigh and Wilkes-Barre Coal Company, No. 5 and No. 9 excepted. Work was resumed at No. 9 on Wednesday.

Last Tuesday, a party of gentlemen, interested in coal operations, went to Hauto in order to examine the working of the slate jigs, invented by Mr. W. H. PLUMB. The feeding of the coal from the pockets being very irregular, it was impossible to ascertain the quantity of coal which passed through the machines, but it was evident to all who were present that the work performed was largely in excess of that performed by Bradford's jigs. Hardly any slate could be detected in the coal.

Kanawha Coal.

We hear of the sale of several tracts of coal lands in the Kanawha Valley recently. A tract of 40,000 acres, situated on the headwaters of Hughes' and Kelley's Creeks, on the east side of the Kanawha River, was purchased by G. W. NORRIS, Esq., of Baltimore, and HENRY CLARK, Esq., of England. A first payment of $50,000 has been made on the purchase. A tract of 2,900 acres at the mouth of Slaughter's Creek was sold to PLINY FISK, Esq., of New York, it is said, for $50,000 cash.

The coal production of the principal mines of the Kanawha Valley, since they were opened, to Dec. 31, 1873, is as follows:

	Bushels.		Tons.
Kanawha & Ohio Coal Co.	11,273,600	Splint and Bitu.	402,628
Campbell's Creek Coal	5,542,800	Splint	197,957
Peytona Cannel Coal Co.	6,000,000	Cannel	214,286
Companies mining in the Peytona tract, 1849-1868, about	5,750,000	Cannel	205,357
In 1873 the production included in the above was—			
Kanawha & Ohio Coal Co.	2,121,500 bushels.		75,768 tons.
Campbell's Creek	1,374,600 "		49,093 "
Peytona	1,300,000 "		46,429 "

COAL PRODUCTION.

Anthracite.

Mined for the week ending March 7, 1874.

	WEEK. tons.	YEAR.* tons.
Wyoming Region.		
Delaware and Hudson Canal Co.	53,430	342,130
Delaware, Lackawanna and Western RR.	43,809	381,251
Pennsylvania Coal Co.	20,887	188,666
Lehigh Valley R.R.	17,365	163,149
Pennsylvania and New York Railroad	386	8,804
Central Railroad of New Jersey	30,484	139,004
Lehigh Region.		
Lehigh Valley Railroad	53,948	449,283
Central Railroad of New Jersey	11,416	85,705
Schuylkill Region.		
Philadelphia and Reading Railroad	45,425	399,810
Shamokin and Lykens Valley	9,318	75,789
Sullivan Region.		
Sullivan and Erie Railroad	102	4,530
Total	286,570	2,238,12

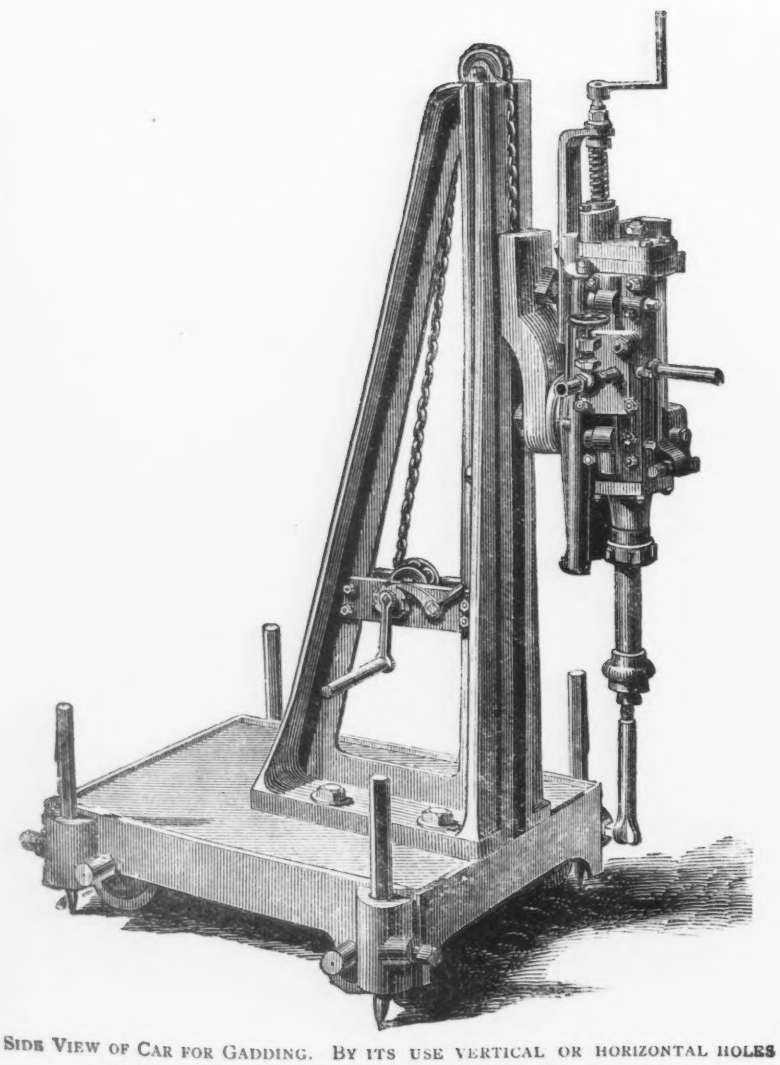
* Year beginning January 1st.

Bituminous.

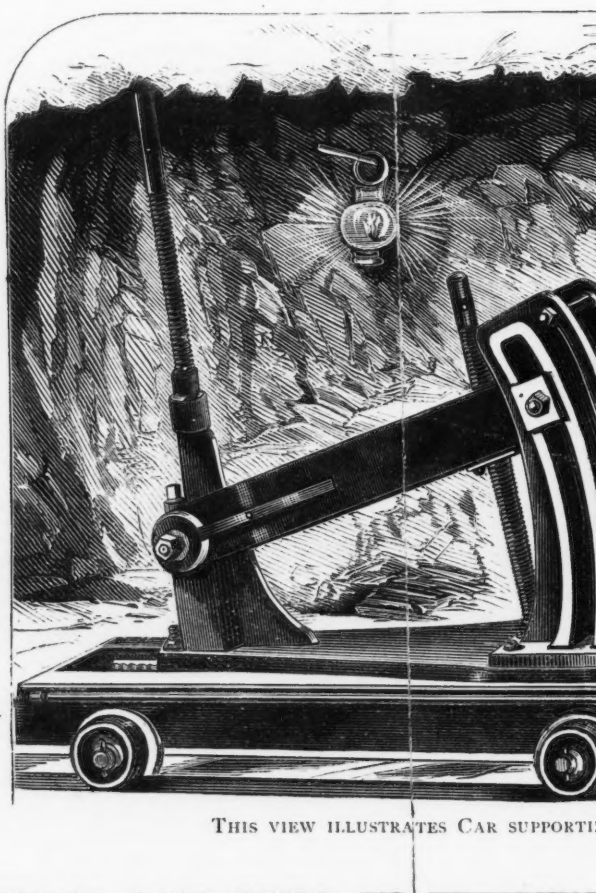
Mined for the Week Ending March 7.

	Week. Tons.	Year. Tons.
Cumberland and Pennsylvania R.R	24,124	188,719
Cumberland Branch R.R.	1,944	19,540
Philadelphia and Reading R.R.	4,295	51,272
Barclay R.R.	295	35,111
Huntingdon & Broad Top R.R.	6,430	62,065
Tyrone Division Penn. R.R.	....	190,532

THE IMPROVED INGERSOLL DRILL, MOUNTED ON TRIPOD FOR VERTICAL DRILLING.



SIDE VIEW OF CAR FOR GADDING. BY ITS USE VERTICAL OR HORIZONTAL HOLES CAN BE DRILLED AND STONE TAKEN OUT TO ANY DIMENSION.



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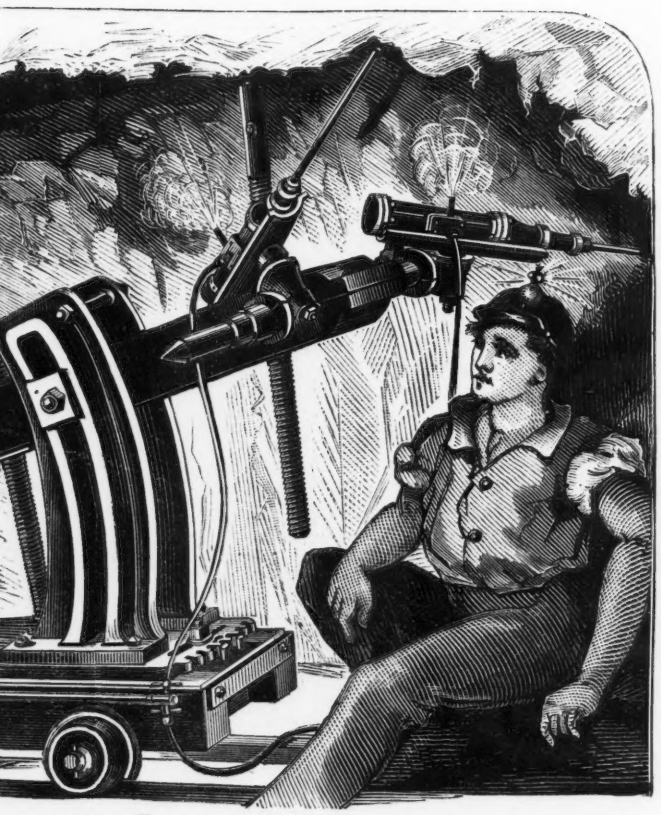
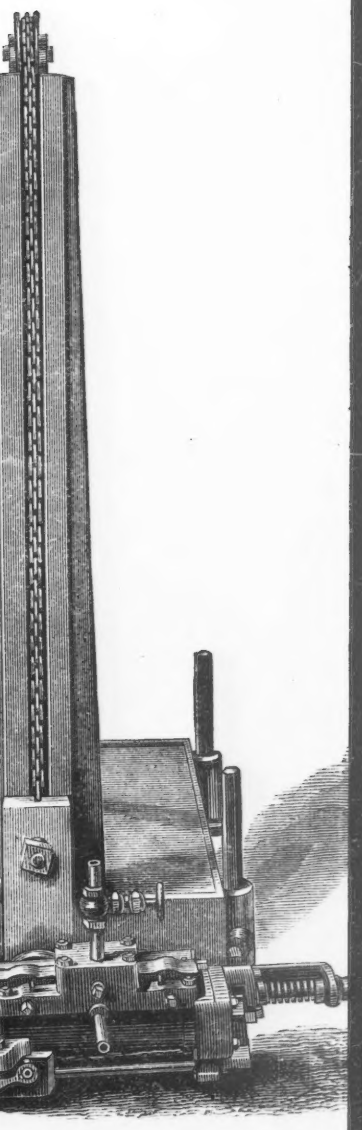
THE INGERSOLL ROCK DRILL, 229 BROADWAY

TUNNELLING COLUMN, FOR USE IN SHAFTS AND SMALL HEADINGS.

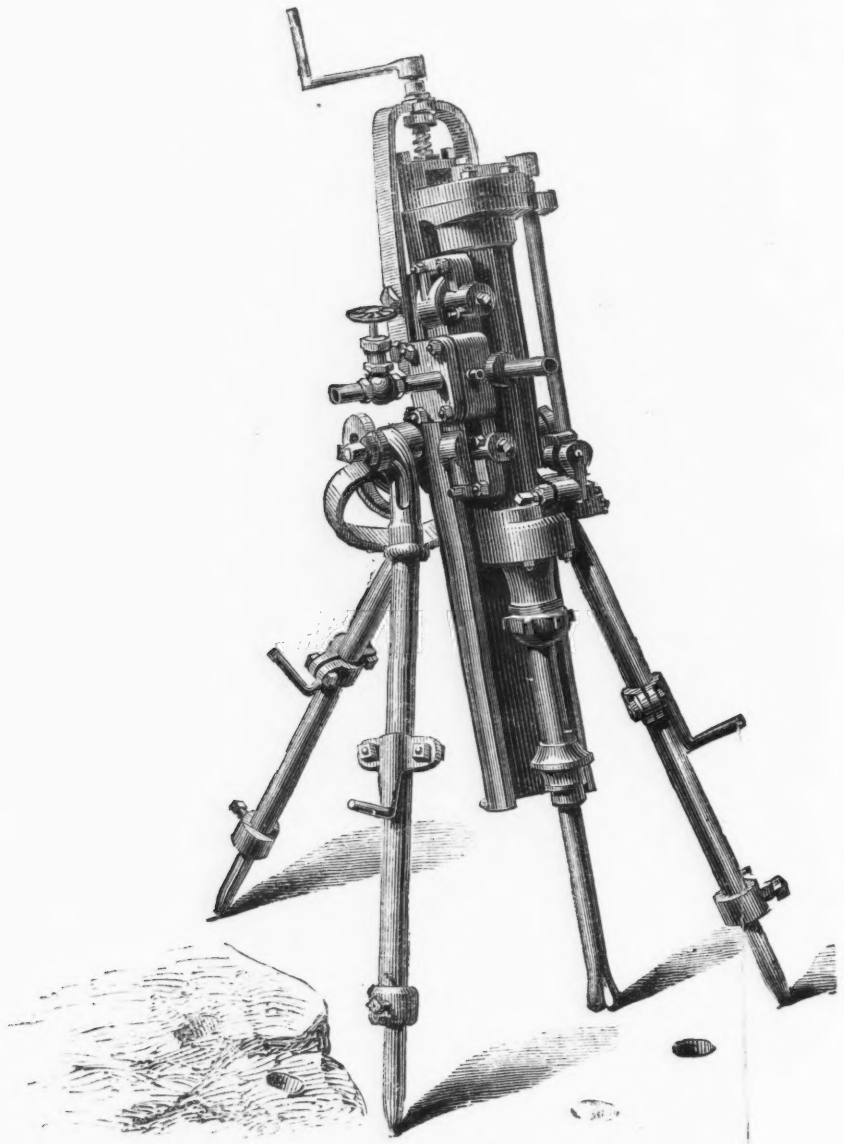


R SUPPORTING DRILL FOR DRIVING HEADINGS.



FRONT VIEW OF GADDING CAR, SHOWING POSITION FOR HORIZONTAL HOLES. DRILL IS ELEVATED TO HEIGHT OF COLUMN, AND HOLES MADE AT ANY TANCE FROM EACH OTHER AS WANTED.

ADWAY, NEW YORK, (after May 1st, at No. 5 Park Place.)



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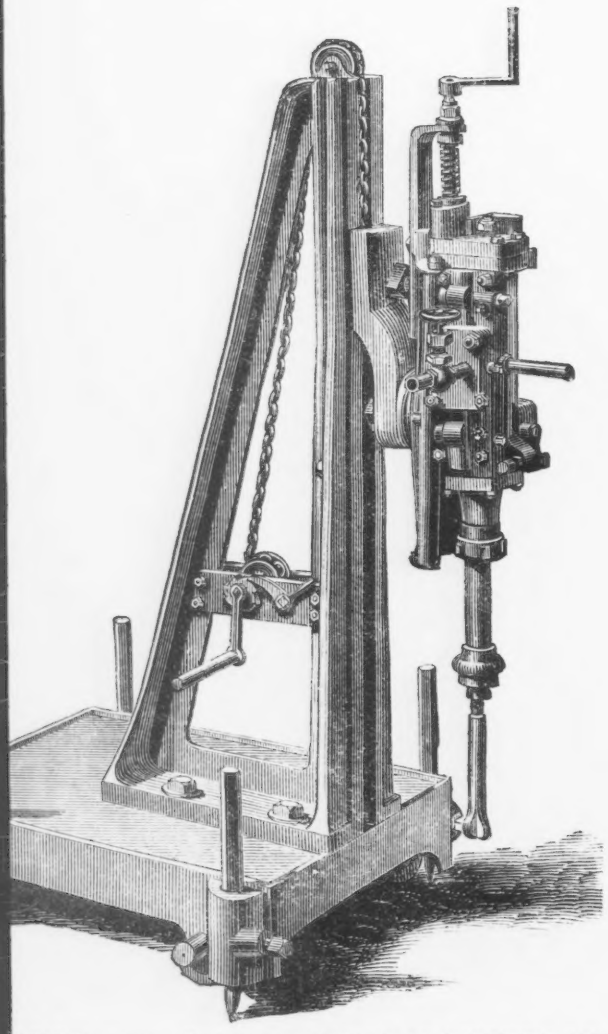

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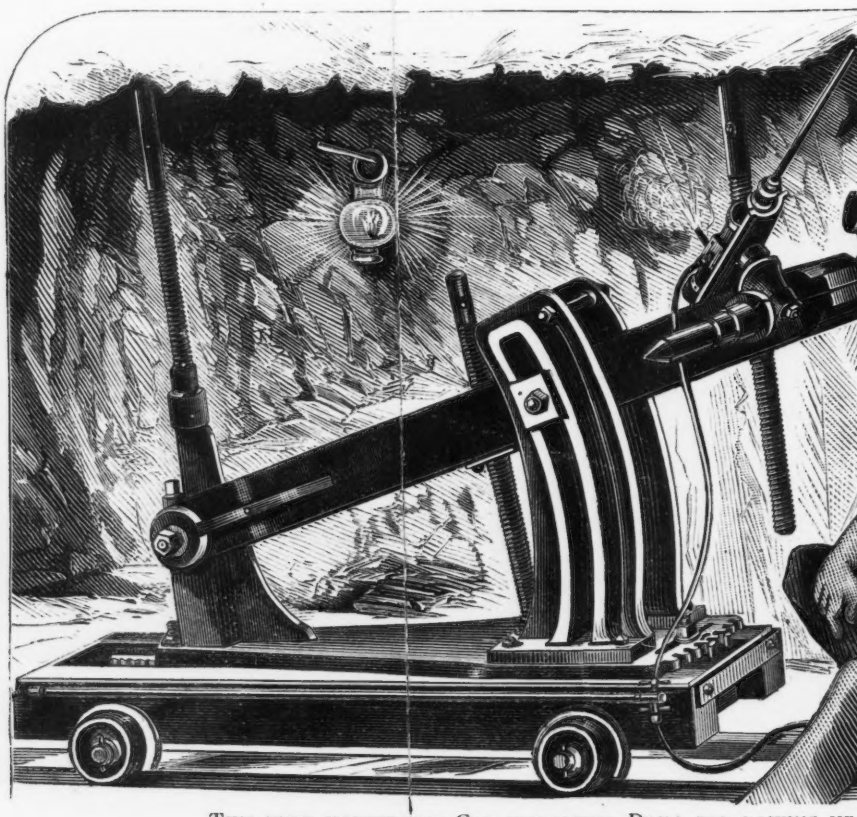

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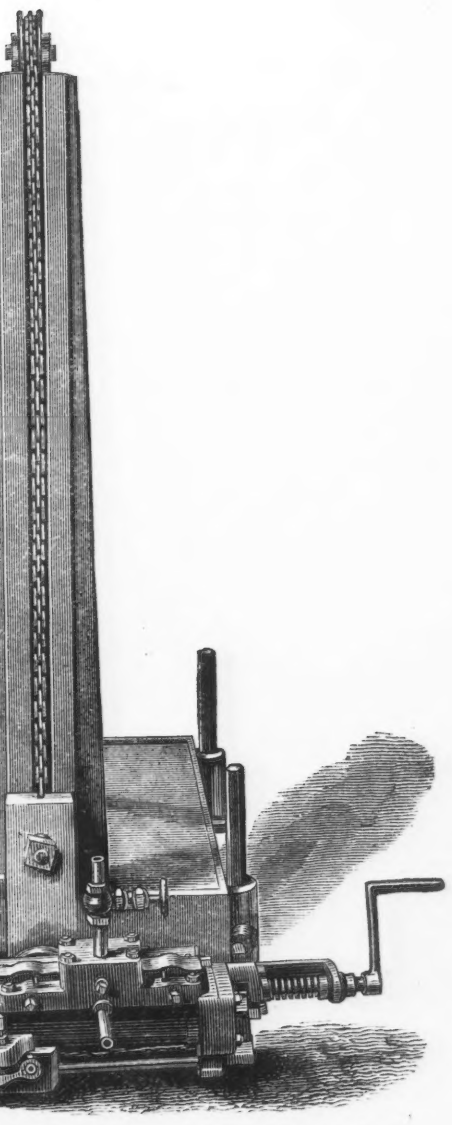

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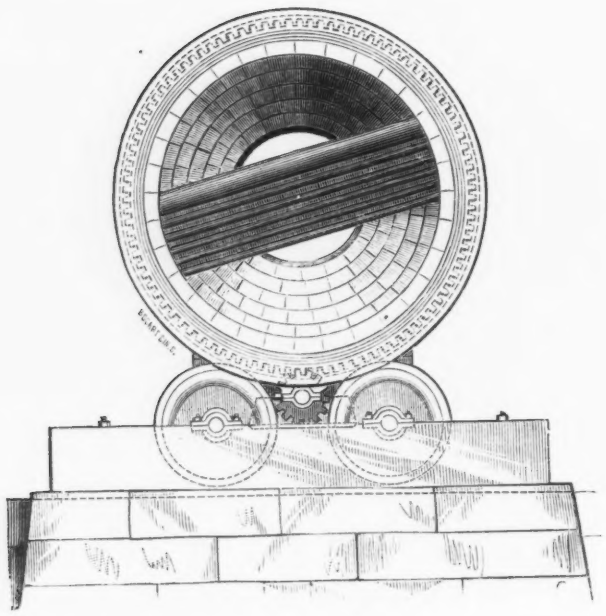
Fig. 3.



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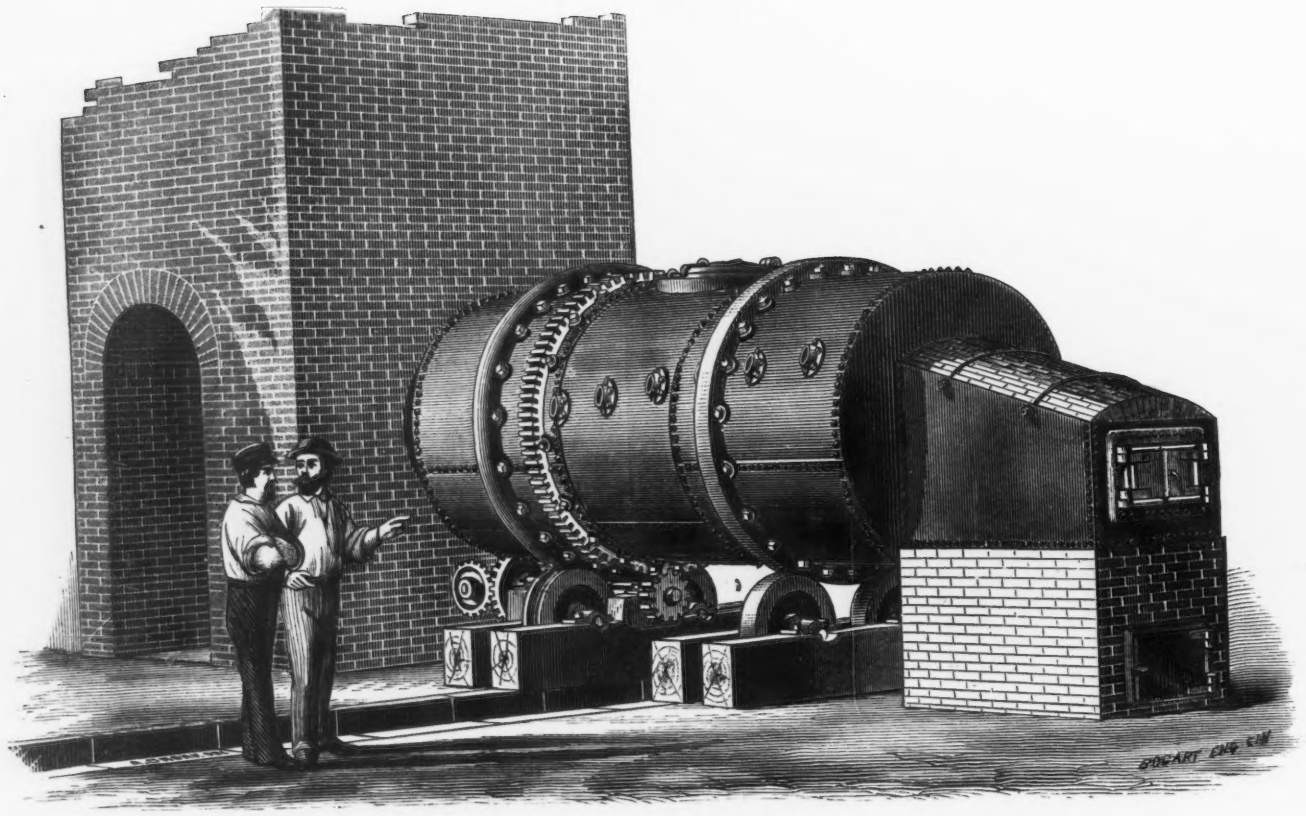


THE BRÜCKNER REVOL

Fig 4.

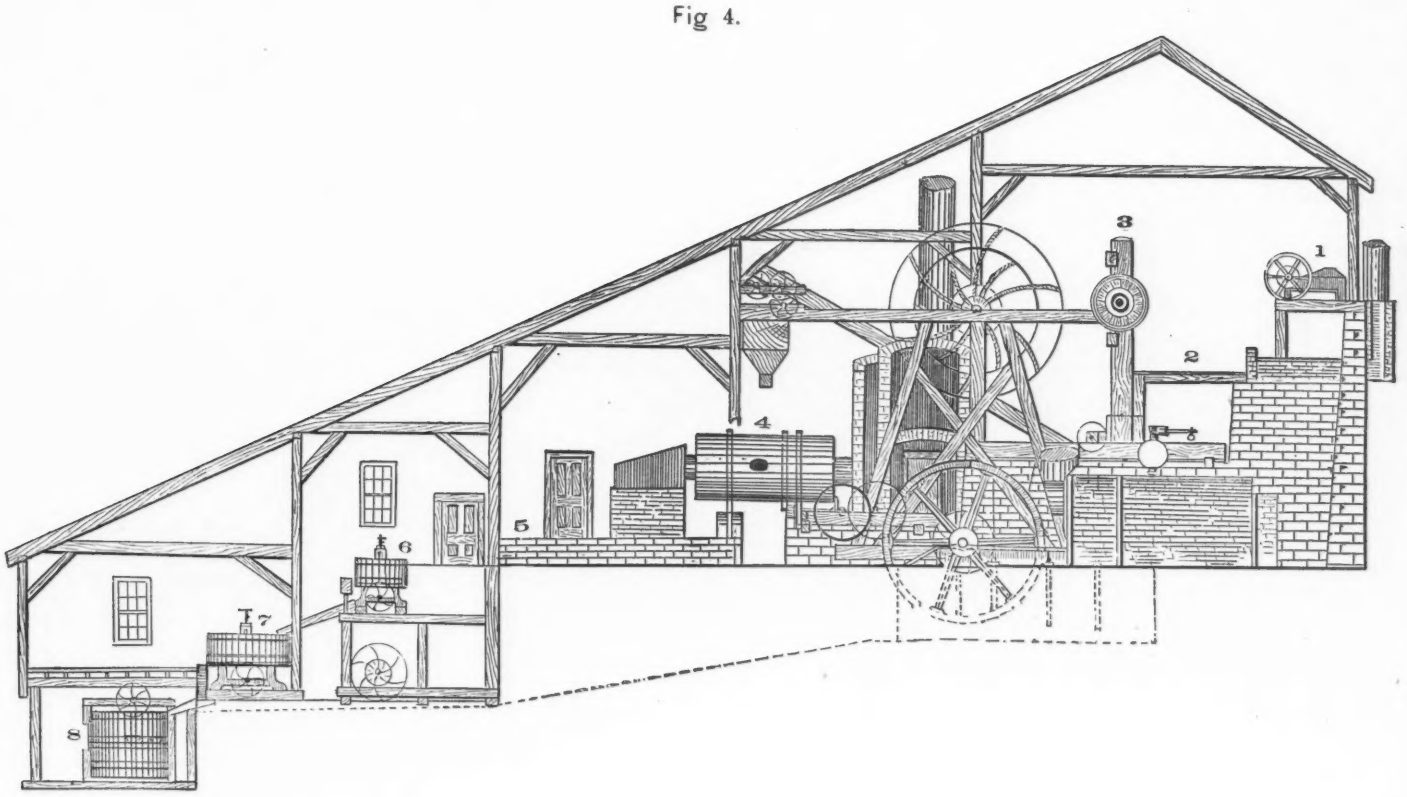
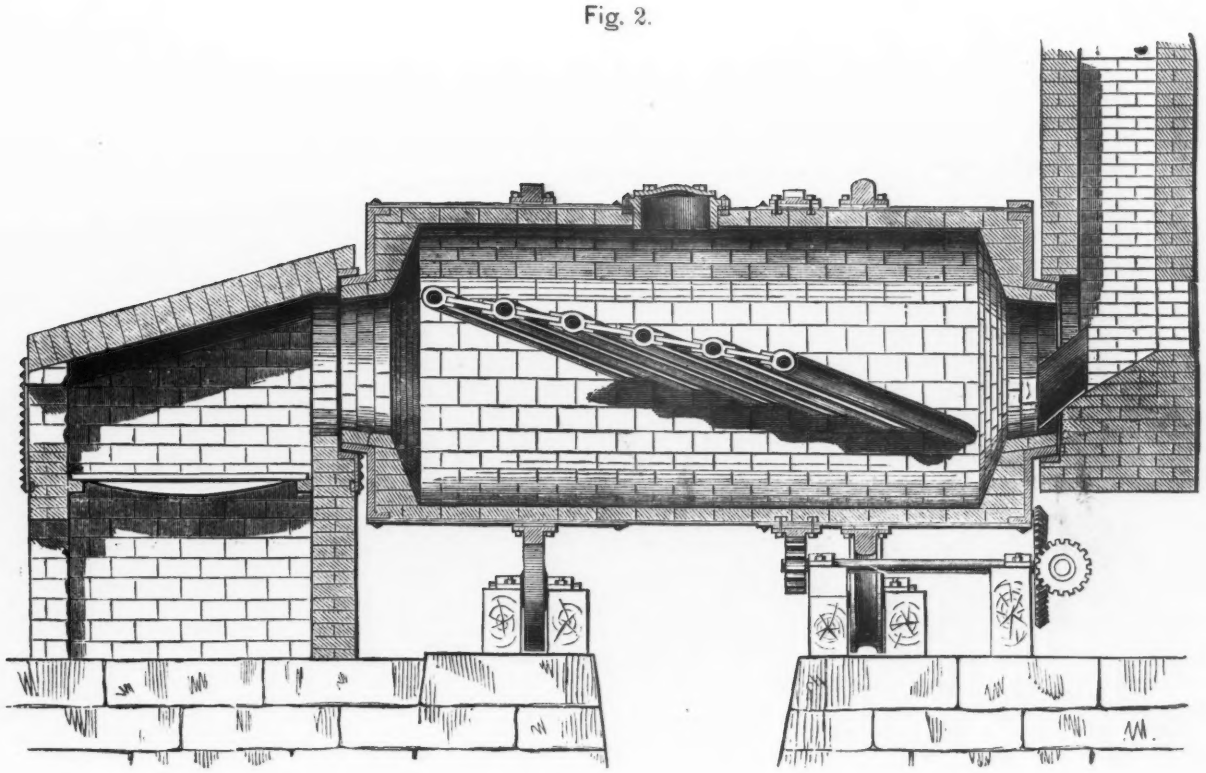


Fig. 2.



REVOLVING FURNACE.

MARKET PRICES OF COAL.

Import Duty on Coal.

Anthracite free. Bituminous, per ton of 28 bushels, 80 lb. to the bushel. 75c., gold.

All slack, or culm, such as will pass through a half-inch screen, per ton of 28 bushels, 80 lb. per bushel, 40c., gold.

Not otherwise provided for, per ton, 40c., gold.

ANTHRACITE.

WHOLESALE PRICES.†

f. o. b. at Shipping Ports.

	Lump.	Steamer.	Grate.	Egg.	Stove.	Chestnut.
Wyoming Coals.						
Scranton at Elizabethport‡	4 70	4 80	4 90	5 05	5 50	4 50
*Lackawanna	4 55	4 65	4 75	4 90	5 35	4 35
§Pittston at Weehawken	4 50	4 50	4 60	4 70	5 10	4 35
Wilkesbarre at Port Johnston	4 55	4 65	4 75	4 90	5 35	4 35
Newport and Plymouth	....	....	4 75	4 90	5 55	4 35
Susquehanna Coal Co. at Amboy	4 70	4 80	4 85	5 00	5 45	4 45
Lehigh Coals.						
Old Company at Port Johnston	5 50	....	5 45	5 45	5 60	4 65
Old Company's Room Run	5 00	....	5 00	5 00	5 35	4 35
Sugar Loaf at Port Johnston	5 50	....	5 45	5 45	5 60	4 65
Hazleton at Elizabethport	5 35	....	5 30	5 30	5 45	4 50
Honey Brook at Elizabethport	5 35	....	5 30	5 30	5 45	4 50
Spring Mt. C. Co. at Hoboken	5 35	5 35	5 30	5 30	5 45	4 50
Beaver Meadow at South Amboy	5 50	....	5 45	5 45	5 60	4 65
McNeal at Port Johnston	5 35	5 35	5 30	5 30	5 45	4 50
Schuylkill Coals at Port Richmond.						
Schuylkill White Ash	4 05	4 15	4 25	4 40	4 85	3 50
Schuylkill Red Ash	....	....	4 40	4 55	4 85	3 75
Shamokin W. and R. Ash	....	....	4 50	4 85	4 85	4 00
N. Franklin	....	....	4 85	4 85	4 85	3 75
Lorberry	....	....	5 00	5 00	5 00	4 00
Lykens Valley	....	....	....	5 50	5 50	4 25

* f. o. b. in New York Harbor.

† Prices for March, as per circulars dated Feb. 19 and 20.

§These are net prices for delivery, during the present month, of coal previously contracted for, and are not rates which the company would now make contracts at.

‡ Scranton sale, Feb. 25, averages: Steamer, 4 52½; grate, 4 53; egg, 4 74; stove, 5 18½; chestnut, 4 19½.

WHOLESALE PRICES.

New York.

	Lump.	Steamer.	Grate.	Egg.	Stove.	Chestnut.
Wyoming Coals.						
Scranton	5 20	5 30	5 40	5 55	6 00	5 00
Lackawanna*	5 05	5 05	5 25	5 40	6 85	4 85
Pittston	4 95	4 95	5 05	5 15	5 65	4 80
Wilkesbarre	5 00	5 10	5 20	5 35	5 80	4 80
Newport & Plymouth	....	...	5 20	5 35	6 00	4 80
Susquehanna Coal Co.	5 20	5 30	5 35	5 50	5 95	4 95
Lehigh Coals.						
Old Company	5 95	....	5 90	5 90	6 05	5 10
Old Co.'s Room Run	5 45	...	5 45	5 45	5 80	4 80
Sugar Loaf	5 95	....	5 90	5 90	6 05	5 10
Hazleton	5 80	....	5 75	5 75	5 90	4 95
Honey Brook	5 80	....	5 75	5 75	5 90	4 95
Spr'g Mount. Coal Co.	5 80	5 80	5 75	5 75	5 90	4 95
Beaver Meadow	6 00	....	5 95	5 95	6 10	5 15
McNeal	5 80	5 80	5 75	5 75	5 90	4 95
Schuylkill Coals.						
Schuylkill W. A.†	4 90	5 00	5 10	5 25	5 70	4 35
" Red Ash	....	....	5 40	5 55	5 85	4 75
Shamokin W. & R. Ash	....	....	5 50	5 85	5 85	5 00
North Franklin	....	....	5 85	5 85	5 85	4 75
Lorberry	....	....	6 00	6 00	6 00	5 00
Lykens Valley	....	....	....	6 50	6 50	5 25

* Delivered on wharf.

† Alongside.

BITUMINOUS.

WHOLESALE PRICES. F. O. B.

Broad Top	$6 50
Derby	6 50
Kittaning	6 50
George's Creek Cumberland	7 00@7 25
West Virginia Gas	8 75
West Virginia Cannel	14 00
Penn. Gas	9 00
Westmoreland Gas	9 00
Ohio Caking	10 00
Ohio Cannel	13 00
Lyonsdale Coal	12 50
James River Bituminous	7 00
" Carbonite	10 00
Kanawha River Cannel	15 25
Liverpool Gas Cannel	14 00
" House "	20 00
Newcastle Gas	10 00
Cannelton Cannel	15 00
Red Bank Cannel	9 00

RETAIL PRICES.

PER TON OF 2000 LB.

Liverpool House Orrel, delivered	$20 00@$22 00
Liverpool House, Cannel, delivered	20 00@ 25 00
American and Block, delivered	16 00@ ——
Straitsville Cannel	16 00@ ——

	Grate and Egg.	Stove.	Chestnut.
Pittston Coal, in yard	$5 60	$5 80	$5 00
Delaware & Hudson, delivered	6 60	6 85	6 10
Scranton, delivered	6 75	7 00	6 25
Wilkesbarre, in yard	6 00	6 25	5 50
Lehigh and Locust Mountain, del'd	7 00	7 50	6 50

Georgetown, D. C., and Alexandria, Va.

George's Creek and Cumberland f. o. b. $4 60@4 75, wholesale.

Buffalo, N. Y.

Youghiogheny Gas Coal	$6 00
Catfish Lump	4 75
" Nut	3 50
" Nut and Slack	3 00
" Slack	2 85
Connellsville coke	8 00
Beaver Gas Coal	6 50
Red Bank Cannel	5 50
" Orrel	5 00

Anthracite, per 2000 lb. in cars; retail prices, delivered, $1 50 per ton additional.

Lump	$6 50
Grate	6 00
Egg	6 25
Stove	6 50
Chestnut	6 25

Baltimore.

Wholesale Prices to Trade.

Corrected weekly by E. Stabler, Jr., coal merchant.

Wilkesbarre, by cargoes or cars	$6 25@....
Pittston and Plymouth	6 00@....
Shamokin Red or White Ash	6 00@6 25
Lykens Valley Red Ash	6 80@....
Retail, per ton 2240 lb. (all kinds)	7 50@ 8 50
George's Creek and Cumberland f. o. b. at Locust Point for cargoes	4 75@5 00
West Va. Gas Coal f. o. b. at Locust Point	6 50@....
Kanawha Cannel, coarse	13 00@....
Tyrone	7 25@....
Ritchie Mineral of West Virginia	19 00@....

Boston, Mass.—March 9.

English Cannel	$25 00@26 00
do do from ship	22 00
Scotch Cannel	15 00@18 00
American Cannel	14 00@15 00
Lingan	8 25
Caledonia	7 75
Pictou	8 25
Sydney	9 00
Acadia	6 75@ 7 25
Cumberland	7 65@ 8 00
Anthracite, retail	8 75@ 9 00
" by cargo	7 50@ 8 00

Chicago, Ill.—March 9.

REPORTED BY RENO & LITTLE, COAL MERCHANTS.

Prices of coal remain unchanged.

Lehigh Lump	$11 00
Lehigh prepared	10 50@11 00
Lackawanna, Wilkesbarre and Pittston	10 00

BITUMINOUS.

Briar Hill and Erie	8 00@ 8 50
Walnut Hill (West Va.)	8 00@ 8 50
Midway (West Va.)	8 00@ 8 50
Cannel	9 00@ 10 00
Blossburg	9 00
Indiana Block	6 50
Hocking "Brooks"	8 00
Wilmington and Illinois	5 00

Cincinnati, O.

There is a moderate demand for consumption. We quote:

Youghiogheny, afloat	9 c.
Ohio River, per bushel	8 c.
Pittsburgh " "	nc.
Anthracite " ton	$11 00

The following are retail prices delivered:

Ohio River, Pomroy, per bushel	12 c.
Kanawha, " "	13 c.
Kanawha Cannel " "	23@24 c.
Pittsburgh, " "	12 c.
Youghiogheny	14 c.

Cleveland, O.

Youghiogheny, f. o. b., per ton	$4 75
Briar Hill	4 00
Massilion	3 60@3 75
Massilion nut	3 50
Chippewa	3 60@3 75
Hocking Valley	3 75
Morris	3 60
Cleveland Lump	3 00
Silver Creek	4 60
Anthracite, prepared	10 00
Anthracite, lump	11 00

Detroit.

A fair demand prevails. The following are present quotations:

Lehigh Lump, per ton	$11 00
Lehigh nut	10 00
Scranton, various sizes	9 50
Blossburg	9 50
Willow Bank	8 00
Briar Hill	8 50
Brookfield	8 75
Chippewa	8 00
Massilon	8 00
Straitsville	5 50
Nut	4 75

Indianapolis.

Per 2000 lb. WHOLESALE.	
Brazil Block	$3 65
Highland	3 20
" steam	3 40
Brazil nut	2 50
Slack	2 20
Virginia Cannel	9 00
Indiana Cannel	7 20
Steam Nut	2 25
Hocking Valley	4 20
Gas Coke per bush	12 c.
Pittsburgh	5 70
Sand Creek	4 00
Anthracite	12 00

Louisville, Ky.

Pittsburgh, afloat	per bushel, 10c.
" retail	" 14 "
Kentucky "	" 12@14"
Indiana and Peacock Pomroy	" 12@14"
Anthracite, per ton, per ton	$10 00@10 50
" afloat	9 00@ ....

Mauch Chunk.

The prices for line trade are:

	* Lehigh.	Wilkes-Barre.
Lump	$3 35	$3 09
Steamboat	3 35	3 09
Broken	3 35	3 34
Egg	3 35	3 34
Stove	3 60	3 49
Chestnut	3 10	3 09
Pea	1 50	....

* Furnace coal remains at $3 50.

New Orleans, La.

The supply is more than sufficient for the demand. On March 1st there was on hand, at the Willow Grove Coal Landing, 124 boats and 9 barges. During February the consumption was 21 boats, and the arrivals 7 boats and 7 barges. Mt. Carbon stock comprises 7000 tons. It is selling at 65c. retail, and 45c. per bbl. wholesale. We quote:

Pittsburgh, wholesale, per bbl	45c.
" at retail	75c.
" per hhd	$7 00
" per box to steamboats	50c.
" " to manufacturers	60c.
Virginia cannel, per bbl	$1 25
Anthracite, per ton	$13 00

Philadelphia.

ANTHRACITE.

Broken, in the yard	$5 50
Egg and Stove	5 75
Chestnut	4 75

BITUMINOUS.

Pennsylvania and Westmoreland Gas	7 50
Broad Top	5 25
Powelton Sterling	5 25
Derby	5 50

75 cents per ton additional for delivery.

Pittsburgh, Pa.

Connellsville coal, per ton	$2 00@2 25
Youghiogheny, at Pittsburgh	2 25
Youghiogheny, at the mines	2 00
Coke on cars " "	3 25
Castle Shannon on Platform, per bushel	9½ c.
Anthracite, nut, per ton, per ton	7 25
" broken	7 50
" egg	7 50
" stove	7 50
" broken on cars	6 75
" stove " "	7 00

San Francisco.

From Commercial Herald, Feb. 26.

"Imports for the past fortnight have been inconsiderable, and the markets void of all animation. The dealers are well stocked with assorted descriptions, while there is very little stock in first hands. Coast supplies continue liberal. Anthracite is scarce. We quote:

West Hartley, wholesale, ex ship, per ton	$13 00	
Wallsend, "	"	12 00
Australian, "	"	11 00@11 50
Coos Bay	"	10 00
Nanaimo	"	11 50
Bellingham Bay, ex ship	"	8 50
Mt. Diablo, coarse	"	8 50
" fine	"	6 25
Anthracite	"	16 00@17 50

St. Louis, Mo.

Delivered in St. Louis 4 cents per bushel extra.

Delivered to railroads and mills by car ferry 2c. per bushel extra.

	Per bushel.	Per ton.
Illinois coal, retail at East St. Louis	9 c.	$2 52
" " manufacturers	8½ c.	2 38
" " delivered	12@12½ c.	3 40
Big Muddy	14 c.	3 92
Trenton	12 c.	3 36
O'Fallon	10 c.	2 66
Anthracite, delivered in St. Louis		$13 50
Missouri cannel, " "		6 50
Indiana cannel		7 00

Toledo.

Grate	$9 00
Egg	9 00
Stove	9 00
Chestnut	9 00
Lehigh Lump	11 00
Blossburg	8 50@ 9 00
Briar Hill	7 00
Bituminous	$4 50 to 6 50 as per quality.

Halifax, N. S.

Sydney Coal, per chaldron	$8 50@ 9 00
Victoria " "	....
Gowrie	7 50
Little Glace Bay	7 50
Albion (at Cunard's wharf)	7 50

Toronto.

Scranton, all sizes, per ton	$7 50
Lehigh prepared, " "	8 50
" Lump	9 00
Bituminous	7 50
Blossburg	7 00

Montreal.

Scotch Steam, 2000 lb. ex yard	$8 00@ 8 50
Lower Port, do	7 00@ 8 00
New Castle Grate, ex yard	9 00@11 00
Welsh Anthracite, per 2000 lb	9 00@10 00
English Coke	—@—
Lump Lehigh, per 2000 lb	9 00@ 9 50
Grate	8 00@—
Egg, American Anthracite	8 75@—
Stove, " "	9 00@—
Chestnut " "	8 50@—

Provincial.

It will be noticed in the following that some of the prices have been fixed for 1874 shipments. Those items not having the * affixed may be considered as nominal.

	Coarse.	Slack.
*Block House, f. o. b. at Cow Bay	$2 25	$1 25
Gowrie	2 25	....
	Coarse.	Culm of Coal.
Pictou nett	$3 00	$1 50
Sydney	3 25	1 00
*Lingan	2 75	1 00
*Caledonia	2 25	....
*Glace Bay	2 25	....

* These prices are fixed for 1874, shipments f. o. b., gold.

Freights.

PORTS.	From Elizabethport, Port Johnson, South Amboy, Hoboken and Weehawken **	From Philadelphia.†	From Baltimore.
Amesbury	....	....	....
Bangor	....	....	....
Bath	....	....	3 00
Boston	2 00	2 50	2 75
‡Bridgeport	90	1 45	2 15
Bristol	....	....	....
Charlestown, Mass	....	....	....
Chelsea, "	2 00	....	....
Davenport	....	....	....
Derby	1 25	....	....
Dighton	....	....	2 25
East Cambridge	2 00	....	....
Fall River	1 20	2 00	2 15
Hackensack	....	....	....
Hartford	....	....	3 00
Hoboken	50	1 15	1 65
Jersey City	50	1 15	1 65
Lynn	2 10	....	....
Middletown	....	....	....
Mystic	1 15	....	....
New Bedford	1 20	2 00	2 25
Newburyport	....	2 75	2 80
New Haven	90	1 50	2 15
New London	1 10	1 65	2 15
Newport	1 20	2 00	....
§New York	50	¶95	1 90
Norwalk	90	....	2 50
Norwich	*1 20	....	2 20
Pawtucket	1 30	....	....
Portland	2 00	2 60	2 65
Portsmouth, N. H	2 25	2 75	2 80
Providence	1 20	2 00	2 15
Rockport	....	....	....
Saco	....	....	....
Somerset	1 25	....	....
Sag Harbor	....	....	....
Salem	2 00	....	2 75
Stamford	90	....	....
Stonington	1 20	....	....
Taunton	....	....	....
Warren	....	....	....
Washington	....	....	....
Wareham	....	....	....
Wareham	....	....	2 75

* Towing from New London about 10c. per ton.
† Nominal.
‡ Under 150 tons, $1 per ton.
§ Under 150 tons, 50c. per ton.
¶ This is the rate alongside. Delivery on wharf costs from 25c. to 18c additional.
** Shipping from Ron'out the same as from Weehawken, the extra expense being borne by the D. and H. Canal Co.

The rate of freight, including wharfage and shipping expenses, from Mauch Chunk to South Amboy, Elizabethport, Port Johnston and Hoboken is $2 28.

Rate of freight from Mauch Chunk to Trenton, including "expenses." $1 97.

Freight to Philadelphia from Mauch Chunk, via N.P.R.R., $2.

TOWING.

Rates for towing on the Hudson River are unavoidably crowded out of this issue.

The following are nominal:

To Elizabethport, full loads and return.....$16 00
To Port Johnson " " " 16 00
To New Haven or Bridgeport.....75 00
Harbor Towing ranges from 4 50 to $6 00.

THE BRITISH COAL TRADE.

LONDON, Feb. 21, 1874.

There is very little change to report in the coal trade during the past week. There is generally a fair demand for steam, gas and manufacturing coals, while for house coals and coke the market continues depressed. The continued inactivity in the manufacture of iron, and the increase in the production of coal, caused by the large number of developments made during the last year, and the desire to realize by those interested in new developments, who have not participated in the recent profits, has a constant tendency to lower prices. It is now generally felt that it is an easy matter to supply the demand, and that prices must decline; and as there has already been a decline of from 13s. to 15s. per ton, with no material reduction in wages, that an immediate reduction must be made. This is now proposed in nearly every district, and in some it has already been made, with but very little resistance from the workmen. In numerous cases, at the pits which have realized largely during the last year, the miners propose to work but three or four days a week, to lessen the output and sustain the price of coal; but the anxiety of the new operators to realize will compel them to work full time at a reduction of wages, which in most cases will be 10 per cent., and in some as much as 20 per cent. The following are some of the leading quotations at the pits: At *Darlington*, best coals, 17s. 6d. to 18s. 6d. per ton; secondary sorts, 16s.; fair coke, 28s. to 30s., and secondary, 26s. At *Barnsley*, best qualities of thick coal can be purchased at from 10s. to 14s. At *Forest of Dean*, best qualities households are quoted at 18s. In Welsh coals, *Merthyr Tydril* is quoted at 15s.; and in Scotland, *Ayrshire* is 11s. per ton.

Great Fall in British Coal and Iron Markets.

Our advices to date (27th February) indicate a general and very heavy reduction in the prices of coal and iron throughout the country. Scotch warrants, after violent fluctuations, could, at the date of our advices, be bought at 88s.

In *Cleveland* a similar depression prevailed, and No. 3 could be obtained for 75s., being a fall of 16s. in the past four weeks.

In *South Staffordshire* all mine pig has declined from £7 10s. at the commencement of the quarter to £6 15s.

Rails are quoted at from £10 to £10 7s. 6d.

Coals are still declining in price. Best Wallsend may be bought at the ship's side in London at 24s., and a general reduction in house coals is expected in a few days. Manufacturing screened coals sell at 13s.; unscreened, 10s. to 12s. per ton. Coke, 24s. to 28s.

In the *Manchester* district a reduction of 1s. 8d. on slack and 10d. on other varieties has been made. A general reduction of wages is taking place, and will probably be not less than 15 per cent., though, naturally, there is much opposition on the part of the men.

Notwithstanding the great fall of prices in both coal and iron, the demand has not increased very greatly, and the impression prevails that the bottom is scarcely yet reached. Our special telegraph reports of to-day (13th March) give the quotations of Scotch iron as 95s. to 104s., which indicates a small advance.

IRON MARKET REVIEW.

Import Duties.

The following are the duties in Gold on Iron:

Flat iron, not less than 1, nor more than 6 inches wide, nor less than ⅛, nor more than 2 inches thick. *Round Iron*, not less than ¼, nor more than 2 inches in diameter, and *Square Iron*, not less than ¼, nor more than 2 inches square ₱ lb. 9-10 of 1c.

Flat Round or Square Iron, of larger or smaller sizes than the above mentioned, per lb.....1 35-100c

Provided, that all iron in slabs, blooms, loops, or other forms, less finished than bars, and more advanced than pig iron, except castings, shall pay the same as iron does.

Provided, that none of the above iron shall pay less than 31½ per cent.

Railroad Iron.....63c. per 100 lb
Boiler plates, or other plate iron not less than 3-16 of an inch thick, per lb.....1 35-100 c
Scrap castings per ton.....$5 40
" wrought " " 7 00
Pig Iron per ton.....6 30
Iron ore 10 per cent. *ad valorem*.

New York,

March 12, 1874.

American Pig.—The demand has been exceedingly light, as the consumption is as low as can well be, without entirely closing the local foundries, which are only working three and four days a week. The sales have been entirely retail, ranging from 10 to 50 tons. The market for cash is weaker than when last reported. The Furnace Companies still refuse to contract at present quotations for deliveries, except for the immediate future. The Crane Iron Co's. furnaces are still out of blast and no indication of their starting, until there is some change for the better; otherwise matters in the Lehigh are the same as when last reported. We quote:

No. 1, Foundry Anthracite.....$34 00@35 00
No. 2, " " .....32 00@33 00
Grey Forge.....28 00@29 00
White and Mottled.....23 00@26 00

Scotch Pig.—The sales during the last week have not reached 300 tons. Seventy tons of Eglinton were sold to-day at $39; 4 mos. and interest. The inquiry is very light. The market is rather unsettled, and cable quotations from Glasgow are somewhat conflicting, although there has undoubtedly been an advance of perhaps 2s. We quote:

Glengarnock.....40 00@41 00
Coltness.....43 00@
Eglington.....40 00@

Iron Rails.—There is but little business and very little inquiry. We learn of the sale of 400 tons English at about $57 gold. The quotations are nominal; American at works, $60@$62 50, and English, $55@$60, f.o.b. here; but a cash offer would undoubtedly secure lower figures.

Bessemer Steel Rails.—There have been no transactions during the last week. There is still some inquiry, but there will not likely be any orders placed at present, unless for necessities. We quote American $103@$105, currency, and English at about the same figures in gold.

Old Rails.—There is no business; we quote at $40@$45.

Scrap Iron.—We quote wrought at $42.50, and cast at $30 from yard.

Scotch Pig.

By Special Cable Report.

GLASGOW, March 12.

Gartsherrie	99s.	Carnbroe	97s.
Coltness	104s.	Eglinton	93s.
Langloan	99s.	Monkland	95s.
Summerlee	98s.	Clyde	95s.
Glengarnock	100s.		

Chicago,

March 9, 1874.

The market is dull. We quote pig iron as follows:

No. 1 Summerlee.....$52 00@ ....
No. 1 Coltness.....53 00@ ....
No. 1 Glengarnock.....51 00@ ....
No. 1 Eglinton.....50 00@ ....
No, 1 Lake Superior.....50 00@ ....
No. 2 Lake Superior.....48 00@ ....
No. 2 Tuscarawas.....48 00@ ....
No. 1 Missouri.....49 00@ ....
No. 2 Missouri.....47 00@ ....
Union "A" 1 (Anthracite).....44 00@ ....
Union "B" 1 (Anthracite).....42 00@ ....

Cincinnati.

March 9, 1874.

There is no marked improvement in demand, the dullness of the market affecting nearly all grades alike. There appears to be some awakening in the car wheel trade, which has resulted in a few sales at reduced prices.

HOT BLAST CHARCOAL.

Hanging Rock, No. 1, per ton.....$38 00@40 00
" No. 2, " .....35 00@37 00
" Forge.....30 00@32 00
Tennessee No 1.....37 00@38 00
Tennessee. No. 2.....34 00@36 00
" Forge.....30 00@32 00
Alabama, No. 1.....38 00@40 00
Missouri, No. 1, Foundry.....38 00@40 00
" No. 2.....35 00@37 00

HOT BLAST STONE COAL.

Missouri, No. 1.....37 00@37 00
" Forge.....30 00@32 00
Ohio No. 1, Foundry.....35 00@37 00
Ohio Forge.....30 00@31 00

COLD BLAST CHARCOAL.

Hanging Rock Car Wheel.....60 00@65 00
Missouri " .....58 00@60 00
Tennessee " .....55 00@58 00
Kentucky " .....55 00@60 00
Georgia " .....55 00@60 00
Alabama " .....55 00@60 00
Machinery and Forge.....55 00@57 00
Blooms.....105 00@116 00

Cleveland.

March 10, 1874.

C. E. Bingham & Co., dealers in pig iron and iron ores, report the market as follows:

The market continues dull in all grades of pig iron. Many brands are offered at a lower figure than they were a week since, and they find few buyers. We quote as follows;

No. 1, Anthracite Foundry.....$34 00@35 00—4 mos
No. 2, " " .....34 00@33 50—4 mos
No. 1, Bituminous " .....34 50@35 50—4 mos
No. 2, " " .....33 00@34 00—4 mos
No. 1, Grey Forge Bituminous.....30 00@31 50—4 mos
No, 2, Close Grey.....29 00@30 00—4 mos
No. 1, Massilon Black Band.....37 00@37 50—4 mos
No. B-1 " " .....35 00@36 00 -4 mos
No. 2 " " .....34 00@35 00—4 mos
No. 1, Lake Superior Charcoal.....42 00@44 00—4 mos
No. 2, " " .....39 00@41 00—4 mos
No. 3, " " .....45 00@47 00—4 mos
Nos 4, 5, 6, " " .....48 00@52 00—4 mos

Detroit,

March 9, 1874.

Scotch pig, net.....$46 00@ ....
Lake Superior pig, net.....44 00@ ....

Louisville.

March 9, 1874.

There has been more life in the pig iron market, resulting from a comparatively good inquiry for car wheel grades. Other descriptions are dull and nominal, with no demand whatever for mill purposes, and dealers are holding at slightly reduced rates. We quote:

HOT BLAST—CHARCOAL.

No. 1 foundry, from Hanging Rock ores.....$40 00@41 00
No. 2 " " " .....35 00@37 00
No. 1, forge, " " .....32 00@33 00
No. 1, foundry, " Tennessee " .....35 00@36 00
No. 2 " " " .....33 00@34 00
No. 1, forge, " " .....31 00@33 00
No. 1, foundry, " Alabama " .....36 00@40 00
No. 1, " " Iron Mountain " .....41 00@43 00

HOT BLAST—STONECOAL.

No. 1, foundry, from Missouri ores.....35 00@38 00
No. 2, " " .....32 00@34 00
No. 1, forge " " .....30 00@32 00

COLD BLAST—CHARCOAL.

Car Wheel from Hanging Rock ores.....60 00@65 00
" " Tennessee " .....55 00@56 00
" " Alabama " .....58 00@60 00
" " Georgia " .....58 00@60 00
" " Missouri " .....55 00@60 00
" " Kentucky " .....55 00@60 00

Pittsburgh.

March 10, 1874.

Reported for the ENGINEERING AND MINING JOURNAL by A. H. CHILDS, commission merchant for the sale of pig iron, blooms, ore, &c.:

Sales of pig iron have been unusually light during the past week, but there is rather more inquiry for choice brands, as the stock in hands of mill owners becomes reduced. Prices have been hardly so firm, and in some instances concessions have been made to effect sales. Foundry irons are especially dull. Quotations are as follows:

No. 1, Foundry, anthracite or bituminous.$33 00@34 00—4 mos
No. 2, " " " .30 00@32 00—4 mos
No. 1, Grey Forge, " " .29 00@30 00—4 mos
No. 2, " " " .....@ ....
White and mottled " " .27 00@28 00—4 mos

The Pittsburgh *Commercial* reports the following sales;

BITUMINOUS COAL SMELTED IRONS FROM LAKE SUPERIOR ORES.

100 tons Gray Forge.....$28—cash
200 tons No. 1 mill red short, at furnace.....30—4 mos
30 tons No. 2 foundry.....32—4 mos
50 tons clear gray forge and mottled.....27—cash.

CONNELLSVILLE COKE.

200 tons No. 1 mill iron.....29—4 mos
40 " " .....30—4 mos

BLOOMS.

100 tons charcoal.....50—4 mos

Philadelphia.

March 12, 1874.

There is but very little improvement to note in the iron market. There has been a sale of 2000 tons of light rails to a Western road, and 1000 tons rails at $68 on the Lehigh. There are negotiations pending for the purchase of from 25,000 to 30,000 tons of rails, one lot of 18,000 tons of 50 lb, for a West-

ern road, for which cash will be given. There is comparatively nothing doing in old rails. Pig iron is quiet but firm.

The following are quotations:

American No. 1	$34 00@35 00
American No. 2	32 00@33 00
American No. 3	29 00@30 00
Scotch—Glengarnock	40 00@41 00
" Eglinton	39 00@40 00
New rails, at works	60 00@65 00

San Francisco.

Feb. 26, 1874.

The trade in pig iron remains very slack and quotations are nominal. Sales include 200 tons soft American pig iron at private terms. We quote English and Scotch pig at $45@$50.

St. Louis.

March 6, 1874.

MISSOURI IRON ORES.

Iron Mountain Co.'s Quotations.

Iron Mountain, per ton	$8 00
Benton Creek, "	7 50
Surface ores, "	8 00
Red and brown hematites, per ton	5 00@6 50
Pilot Knob, per ton	5 50

PIG IRONS.

Iron Mountain and Irondale Charcoal, hot blast metals. (4 months' time), No. 1	$45 00@46 00
No. 2, same as above	40 00@43 00
Mottled and white	50 00@

THE BRITISH IRON TRADE.

LONDON, Feb 21, 1874.

The elections are all over, but it appears difficult to bring men down to business again. In the pig iron market there has been a general decline, which will undoubtedly continue proportionately with the decline in coal and wages. The market for manufactured iron has been rather firm. There is considerable inquiry, but very few orders are being placed. It is stated that in Wales they are accepting orders for rails at £1 per ton less than they can be remuneratively manufactured for in the north of England. There is an abundance of orders for machinery plates, light rails, &c. During the last few weeks considerable inquiry has sprung up for Bessemer pig. At Sheffield the Bessemer makers are doing very well, all things considered, and the output from the Atlas Works is rather larger than it has been, although there is a considerable number of men out, in consequence of the proposed reduction of wages. The demand for crucible steel is much better, although several of the works are not working more than four or five days a week. The following are the principal quotations: At Newcastle-upon-Tyne, No. 1 pig at 86s.@90s., f. o. b., and No. 3 at 78s.@82s. 6d. At Middlesbrough-on-Tees, No. 3 at 78s.@80s. At Darlington, No. 3 at 79s.@81s.; No. 4 forge at 74s.@76s., and rails at £7 7s. 6d.@£7 10s. At Manchester, No. 1 Pig at 94s.; No. 3 at 88s.; No. 4 (foundry), 86s. 6d., and No. 4 (forge), 86s. 6d. At Wolverhampton, all mine hot blast at £6 15s.@£7. At Birmingham, all mine hot blast at £7 5s.@£7 10s. At Dudley, all mine hot blast, £7@£7 10s., and cold blast, £8@£8 10s.

THE SCOTCH IRON MARKET.

GLASGOW, Feb. 19, 1874.

During the past week there have been numerous fluctuations in the warrant market; it opened at 95s., and closed to day at 92s. The highest figure reached was 96s., and the lowest 90s. The prices of the principal makers' brands are still very irregular, and, as will be observed by the following quotations, they have fallen in sympathy with the warrants: Garthsherrie, No. 1, 105s.; No. 3, 97s.; Coltness, 108s. and 97s. 6d.; Summerlee, 102s.6d. and 95s.; Carnbroe, 100s. and 97s.; Monkland, 95s.6d. and 93s.6d.; Govan, 95s. 6d. and 93s. 6d.; Langloan, 107s. 6d. and 97s. 6d.; Calder, 105s. and 95s.; Glengarnock, 102s.6d. and 98s.; Eglinton, 97s. and 95s.; Dalmellington, 98s. and 96s.; Carron, 107s.6d.; Shotts, 105s. and 97s.6d.; Kinneil, 100s. and 94s. The shipments from Scotch ports were 912 tons below those of the corresponding week of 1873, and the imports of Middlesbrough pigs at Grangemouth show an increase of 2,790 tons.

Later advices just received, and dated 26th February, state that there is a further decline of 4s. from the above quotations. The highest price paid during the week was 91s. 3d., at which it opened, and falling to 86s. 6d., closing on the 26th at 88s.—sellers 87s. 9d., buyers prompt.

Makers' iron has been reduced during the week 4s. to 10s. per ton. No. 1 Garthsherrie, 100s.; No. 3, 93s.

The coal and iron masters are about to reduce the wages 2s. per day, and in some districts the miners are working only thirty-two hours a week.

METALS.

NEW YORK, March 12, 1874.

Gold Coin.—During the last week gold has ranged from 111¼ to 112⅛, and closed to-day at 112.

Bullion.—Fine silver bar, $1 26 per ounce. Fine gold bar at ½ per cent. premium—$20 77 per ounce

Copper.—Ingot is quoted 24@24½c., cash. The sales during the last week amounted to less than 50,000 lb. at the above figures. There is a firmer feeling. Yellow metal is in moderate request.

Tin.—There is a very small demand for pig. Straits are nominal in price. Sales of English have been as low as 21½c., gold, for L. and F., ane 23¾c. for refined, closing, however, at 24⅜c. for refined, and 21¾@22c. for spot lots of L. and F.; sales have been made of 40 tons L. and F., to arrive, at 22⅛@24½c., seller's option to arrive, or deliver from store; 15 tons refined, on the spot, 23¾@24⅛c.; and 30 tons do., mostly to arrive and for shipment, 23¾@24c., gold.

Lead.—There is comparatively nothing doing in pig lead, which is quoted at 6¼@6¾c., gold, for foreign. There have been no sales of consequence in Western.

Spelter.—There is but very little demand for foreign, and prices are nominally 6¾c. to 7c., gold, for Silesian. Western is in limited demand at 7⅛c., currency.

Antimony.—The demand for Regulus is very limited; it is quoted at 13@13½c., gold, according to brand.

San Francisco Stock Market.

BY TELEGRAPH.

NEW YORK, March 12, 1874.

The following report from the San Francisco Stock Board is dated the 10th inst. The market is irregular, with the general tendency upward, Savage, Gould & Curry, and Belcher being the only exceptions to an improved feeling in the market. A dividend of $5 per share has been declared by the Belcher Mining Co., payable on the 10th inst. The Crown Point Co. have also declared a dividend of $3 per share, payable on the 12th inst.:

Savage	75	Imperial	6
Crown Point	90	Raymond & Ely	27
Yellow Jacket	61	Meadow Valley	11
Kentuck	19	Eureka V G	10
Chollar Potosi	62	Ophir	—
Gould & Curry	18	Hale & Norcross	—
Belcher	81		

Boston Stock Market.

BOSTON, March 11, 1874.

We give in the following, quotations of all copper stocks dealt in at the Boston Stock Board, omitting those stocks the price of which falls below $1 per share:

Allouez	7¼	Petherick	2⅛
Calumet and Hecla Co.	140	Pewabic	7
Copper Falls	24	Pœnix	15
Central	27	Quincy	37½
Franklin	4¼	Ridge	6
Hanover	50	Rockland	1⅛
Humboldt	50	St. Clair	2⅛
Mesnard	1	Star	1½
National	4⅜		

American Institute of Mining Engineers.

OFFICIAL BULLETIN.

Announcements to Members and Associates.

I. The ENGINEERING AND MINING JOURNAL, which is the Organ of the Institute, and contains its proceedings, transactions and notices of meetings, will be sent to each Member and Associate on the payment of his annual dues. Back numbers cannot, as a rule, be sent.

II. Dues (ten dollars per annum) are payable on election and at the annual (May) meeting. Members and associates elected at the February meeting pay ten dollars only to May of the following year. Remittances should be made, as far as possible, by P. O. Order, payable to the Secretary.

III. A few copies of the first volume of the transactions have been reserved by the Council for purposes of exchanges, etc., with libraries, scientific societies, or technical journals. The lists for these objects are now in course of preparation. Professor THOMAS EGLESTON, of the School of Mines, Columbia College, New York City, has charge of the list of foreign periodicals and professional societies, to which copies of the Transactions should be sent; Professor F. PRIME, Jr., Lafayette College, Easton, Pa., has the list of technical and public libraries in this country, and Mr. RAYMOND that of American periodicals and professional societies. Each of these gentlemen desires suggestions from members of the Institute; and from the names suggested the final lists will be made up, governing the distribution of free copies of the Transactions.

IV. The Council earnestly requests members to forward to the Secretary, for preservation, copies of all printed mining and geological reports, particularly pamphlets, which may fall in their way. It is believed that by this means a large amount of valuable fugitive information concerning different regions and properties in this country, may be caught and preserved.

V. According to the Fourth Rule of the Institute, the Vice Presidents and Managers have classified themselves by lot, with the following result:

Vice Presidents: Messrs. ROTHWELL, PECHIN and BLANDY retire May, 1874; Messrs. COXE, EGLESTON and BLAKE retire May, 1875.

Managers: Messrs. PETTEE, PRIME and FIRMSTONE retire May, 1874; Messrs. MAYNARD, SYMONS and LESLEY retire May, 1875; Messrs. CORYELL, HEWITT and HUNT retire May, 1876.

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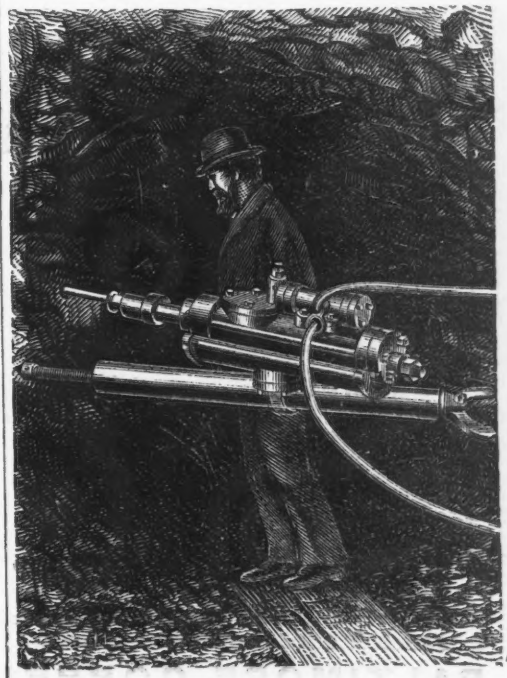

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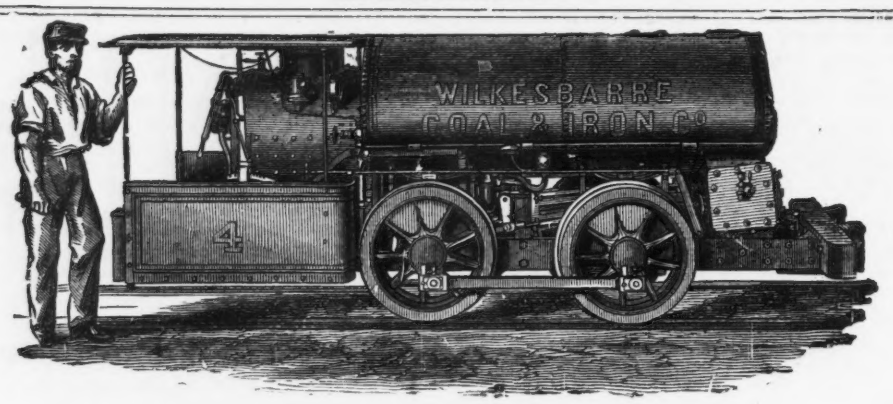

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